AUTOMOTIVE INDUSTRIES

LAND — AIR — WATER

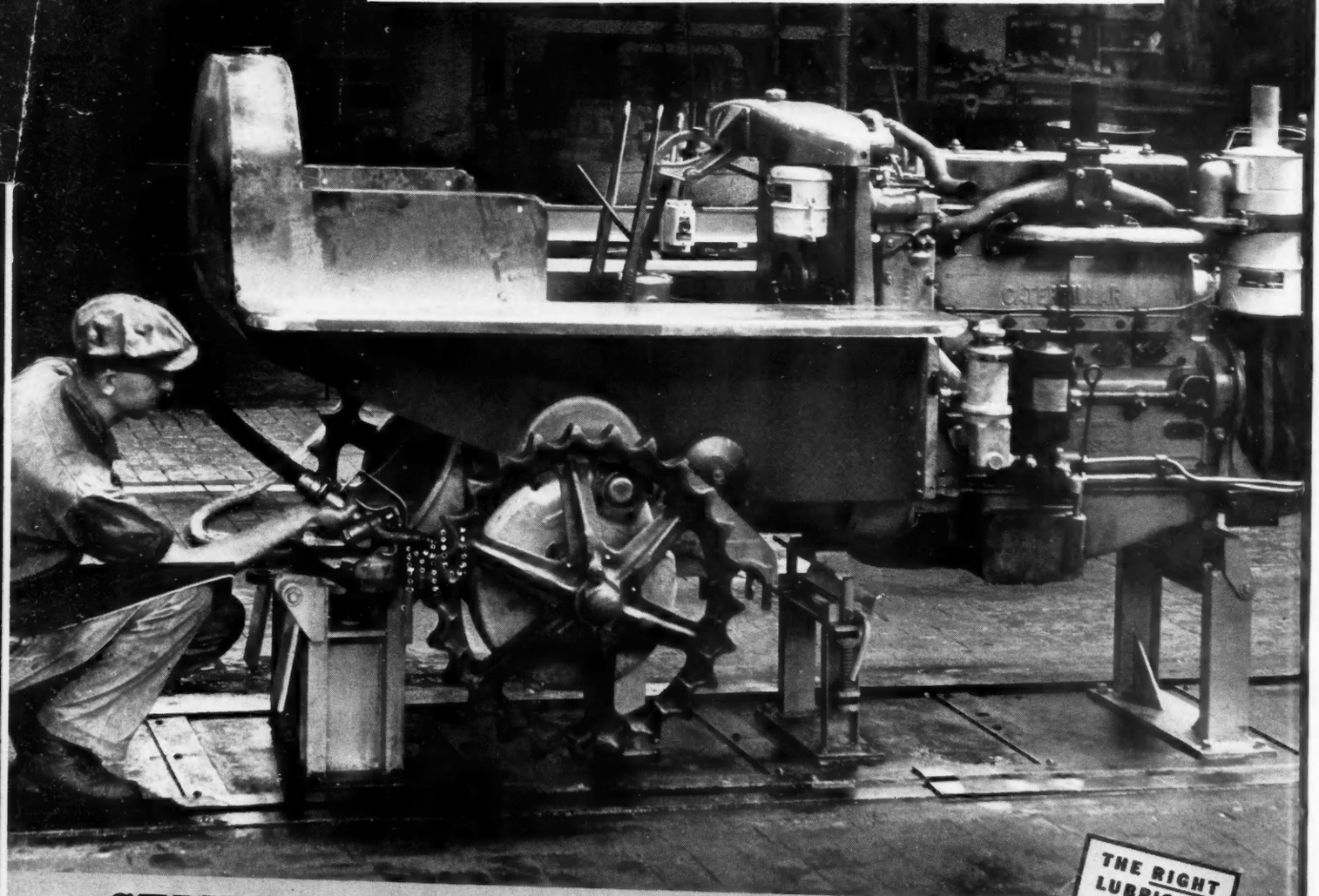
JULY 2, 1938

STANDARD OIL LUBRICANTS *contribute to "Caterpillar's" low-cost performance records*

• The well known low-cost performance records of "Caterpillar" track-type Tractors and Diesel Engines are made possible in no small measure by the careful consideration given to the choice of lubricants used both in the plant and on these units.

Standard Oil lubricants contribute their share to many operations in the plant and in servicing the equipment before it leaves the factory. Accurate lubrication recommendations reduce plant operating costs—a saving that is passed on directly to buyers of "Caterpillar" Products. Standard products at many important points in "Caterpillar" track-type Tractors start them on the years of trouble-free operation which "Caterpillar" owners enjoy.

In modern, highly efficient manufacturing plants, such as "Caterpillar" has, Standard Lubrication Engineering service has proved helpful. This service is available to all manufacturers in Standard Oil (Indiana) territory. *It is free.* Call the Lubrication Engineer at your local Standard Oil (Indiana) office or write 910 South Michigan Avenue, Chicago, Illinois.



STANDARD OIL COMPANY (INDIANA)

LUBRICATION ENGINEERING

THE RIGHT LUBRICANT • PROPERLY APPLIED • TO REDUCE COSTS

Published Weekly
Founded 1895

AUTOMOTIVE INDUSTRIES

Vol. 79, No. 1
July 2, 1938

Production

Maintenance of Even Production Pace Viewed As Encouraging

The automotive industry's production record for June unofficially estimated as being in the neighborhood of 170,000 cars and trucks, is being interpreted as a favorable development because a constant level was maintained throughout the month whereas a continued tapering off had originally been anticipated.

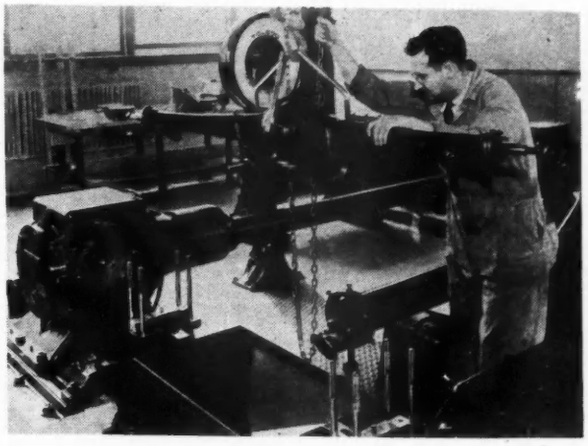
While the month does not compare favorably with last year's production in June of more than 521,000 cars and trucks, this ability to maintain an even pace under prevailing business conditions is looked upon as decidedly encouraging. As a further result prospects for July are somewhat brighter than they were a fortnight or two ago even though it is anticipated that July's output will be lower than June's.

Factories generally report that sales have become firmer at the current low levels and that the result should be a continued reduction in dealers' stocks to eliminate in large degree any necessity for clean-ups when new models are announced later in the year. Used car stocks also are reported to be reducing with dealers in numerous instances shopping for the trade-ins that will enable them to "sweeten" their used car inventories.

The major share of the current week's production will be credited to June with the last four days of the month falling in this week, and with most producers operating on schedules of four days per week or less. A preliminary survey of production plans, made early in the week, indicates that output should again total a few hundred units under 40,000 cars and trucks, representing practically no change from the rate in effect since the first full week in the month.

Production of individual units of the larger corporations as well as that of independents remained practically unchanged from their output of a week ago, with General Motors' estimated 16,200 cars and trucks leading the "big three" and Studebaker's 1450 in the van of the independents.—J. A. L.

REAR AXLE dynamometer just perfected and completed by Chrysler Corp. and now being used to test DeSoto rear axles. "It is more accurate and thorough than any dynamometer formerly used," says Karl Pfeiffer, head of Chrysler's mechanical engineering laboratory, "and should prove invaluable in helping engineers make future rear axle developments."



Labor

Heads of 40 UAW Locals Combine To Force Peace Within Union

Alarmed over the future of their United Automobile Workers Union, because of the continued impasse on the international executive board between factions supporting Homer Martin, president, and those supporting the five union officers he recently suspended, presidents of 40 UAW locals in the Detroit area have taken steps which they fervently hope will force an early peace.

After a meeting with Martin and his supporters on the executive board a delegation representing the locals' presidents reported that it was making progress in its peace plans although Martin was quoted as saying that the incident involving suspension of the five officers, "is closed."

The group of presidents, after a closed meeting, drew up a peace program addressed to the executive board which was presented at the later meeting with Martin, and indicated that if it did not produce the desired results an appeal would be made to John L. Lewis, head of the CIO, to direct personally arbitration that would preserve the welfare and objectives of the union.

The program, as drawn and presented, demands: that the 20-point peace program signed by all international officers several months ago be made the basis of cooperation between all groups in the union; the immediate reinstatement of the five suspended officers; cessation of the violent exchange of personalities between the warring groups; solution of its internal difficulties by the union itself with the alternative of an appeal to Lewis for arbitration; and promises a strict watch over the activities of all officers and board

(Turn to page 9, please)

N.I.A.A. To Hold '38 Conference In Cleveland, Sept. 21-23

The National Industrial Advertisers Association will hold its sixteenth annual conference at the Statler Hotel, Cleveland, Sept. 21-23, according to Stanley A. Knisely, advertising director of the Republic Steel Corp., who, as vice-president of the association, heads its committee for conference program and arrangements.

Goodyear Group Opposes URW Pact

Employes Association Presents Resolutions to Management Asking Company to Make No Contract With CIO Union

Claiming that the United Rubber Workers Union of the CIO now represents only a small minority of company employes, the recently formed Goodyear Independent Employes Association of Akron has sent resolutions to Goodyear officials demanding that the company enter into no contract with the URW. Negotiations looking toward a contract have been in progress since termination May 31 of the Goodyear strike which followed a riot in which five were shot and nearly 100 were injured. The resolutions were passed at a special meeting of the new association. The Goodyear URW local won collective bargaining rights last August by a vote of 8464 to 3193. The new Association, organized at the start of the current year, now claims that it represents a majority of employes. Association officials said they soon would have petitions ready to submit to the National Labor Relations Board asking for a bargaining election at Goodyear.

The resolutions sent to the Goodyear management read:

"Whereas, the invasion of Goodyear by Goodyear branch of the United Rubber Workers of America has brought to Goodyear employes only unstable employment, industrial strife, a substantial loss in earnings by employes and the loss of 6000 jobs; and,

"Whereas, the leadership of this organization has demonstrated its complete inability to adjust with management the just grievances of Goodyear employes; and,

"Whereas, the domination of this organization by non-resident officials of the Committee on Industrial Organization has resulted in a complete disregard of the welfare of Goodyear employes, and has demoralized the friendly relations which previously existed between them; and,

"Whereas, the Goodyear local of the United Rubber Workers of America represents only a small minority of Akron Goodyear men and women,

"Therefore, be it resolved that we vigorously oppose further representation of Goodyear employes by the Goodyear branch of the United Rubber Workers of America.

"And be it further resolved that we demand of Goodyear management that it enter into no contract, written or oral, with this minority organization that will in any wise affect employes which this Committee on Industrial Organization affiliate does not represent.

"Be it further resolved that a copy of this resolution, duly certified, be forthwith transmitted to officials of the Goodyear Tire & Rubber Company."

May Aircraft Exports Duplicate April With 167.5% Increase Over 1937

The record in May was no exception to the sensational monthly advances of 1938 exports of "airplanes, seaplanes and other aircraft" as compared with the 1937 record for this classification. Dollar volume for this month reached for the ceiling to total $5,102,526, an increase of roughly 167.5 per cent over the same month last year. It may be recalled that April exports in this classification increased virtually the same amount as compared with April, 1937. The May figure brings the five months', 1938, total to $16,556,780, which is approximately 118 per cent above the total for the similar period in 1937.

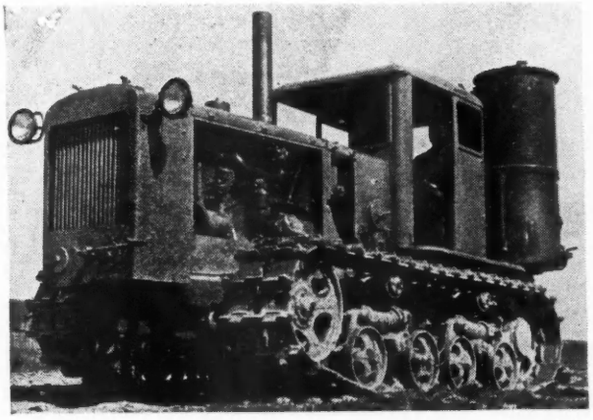
Dollar volume of exported "automobiles, parts and accessories" for May totaled $20,652,751, a slump of about 38 per cent below the 1937 figure. However, for the five months ended May this year, the total dollar volume amounted to only 5.5 per cent less than the 1937 amount for the same period.

	MAY 1938		MAY 1937		FIVE MONTHS ENDED MAY 1938		FIVE MONTHS ENDED MAY 1937	
	No.	Value	No.	Value	No.	Value	No.	Value
EXPORTS								
Automobiles, parts and accessories		$ 20,562,751		$ 33,168,892		$ 138,336,854		$ 146,339,972
PASSENGER CARS								
Passenger cars and chassis	12,025	7,380,791	23,293	13,995,125	82,998	51,864,879	105,194	62,238,472
Low price range $850 inclusive	10,652	5,890,676	21,165	11,666,273	72,418	40,356,857	95,742	51,750,726
Medium price range over $850 to $1,200	1,169	1,151,562	1,777	1,675,103	9,055	8,949,420	7,705	7,306,011
$1,200 to $2,000	170	252,392	259	392,563	1,215	1,795,729	1,268	1,955,163
Over $2,000	34	86,161	93	261,186	308	762,873	479	1,226,572
COMMERCIAL VEHICLES								
Motor trucks, buses and chassis (total)	7,434	5,165,057	14,773	8,446,149	60,882	38,487,485	61,137	33,799,657
Under one ton	1,238	558,207	1,770	706,107	8,636	3,657,896	7,578	2,880,593
One and up to 1½ tons	4,543	2,612,905	9,711	4,637,550	41,760	22,657,147	42,205	19,660,938
Over 1½ tons to 2½ tons	976	815,535	2,467	1,749,766	6,495	5,270,699	8,183	6,372,396
Over 2½ tons	525	1,071,602	593	1,193,299	3,061	6,226,326	2,579	4,449,257
Bus chassis	152	106,808	232	159,418	930	675,417	592	436,473
PARTS, ETC.								
Parts except engines and tires								
Automobile unit assemblies		3,923,457		5,343,007		25,009,719		25,898,336
Automobile parts for replacement (n.e.s.)		2,882,315		3,386,296		15,589,228		15,386,796
Other automobile accessories (n.e.s.)		333,432		328,282		1,475,861		1,755,559
Automobile service appliances		549,259		623,493		2,642,216		2,724,300
Airplanes, seaplanes and other aircraft	103	5,102,526	54	1,907,154	342	16,556,780	230	7,604,105
Parts of airplanes, except engines and tires		2,162,903		747,296		9,753,825		3,299,927
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and semi-Diesel	44	312,787	93	178,257	235	1,190,063	354	750,933
Other stationary and portable								
Not over 10 hp.	1,147	73,081	1,227	86,754	5,039	342,395	9,251	502,645
Over 10 hp.	591	214,676	595	200,699	1,784	704,639	1,581	724,725
Engines for:								
Motor trucks and buses	1,701	201,598	2,996	287,465	14,312	1,581,696	15,140	1,502,330
Passenger cars	2,155	190,604	11,262	755,597	25,411	2,066,891	45,002	3,021,384
Aircraft	80	529,792	130	728,643	498	2,742,651	486	2,751,975
Accessories and parts (carburetors)		226,312		263,513		1,234,158		1,151,312
IMPORTS								
Automobiles (dutiable)	42	28,966	126	141,530	274	166,927	559	425,994

. . . slants

WAGE *payments of the automobile industry in the first '38 quarter were 48½ per cent below the corresponding '37 period. According to the Weekly Business Letter the industry's net profits, however, declined 92½ per cent during this time.*

BRITISH *motorists, point out engineers of the Esso Marketers, use one barrel of automotive lubricant to*



Sovfoto

TRACTOR equipped with charcoal gas generator which is reported to have recently successfully passed all tests at the scientific auto-tractor institute (NATI) in Soviet Russia. The tractor was built for the "KhTZ" (Kharkov Tractor Plant).

only 11.6 *barrels of fuel, as compared to one barrel of lubricant to* 21.6 *of fuel in the United States.*

DIFFICULTY *to be overcome in the development of a satisfactory mechanical cotton picker is the failure to harvest existing varieties of high quality seed cotton without serious damage to the lint, claims Charles A. Bennett, U. S. Bureau of Agricultural Engineering.*

RAILROADS *handled* 1,361,848 *carloads of petroleum oils, refined and all other gasolines in* 1937, *according to J. S. Marvin of the Automobile Manufacturers Association, who states that earnings on these shipments amounted to* $169,292,514. *It is estimated that* 89 *per cent of the total gasoline consumption in the United States is used by motor vehicles.*

Caterpillar Pares Prices

Substantial price reductions in its line of track-type tractors and Diesel engines were announced last week by the Caterpillar Tractor Co. The reductions in the tractor line affected all sizes except the Twenty-Two (the price of which had already been reduced $200 several weeks earlier) and ranged from $150 to $650 on the several sizes of tractors and from $175 to $750 on the Diesel engine line. Prices for six of the eight current sizes of "Caterpillar" Diesel engines were affected by the move.

Casing Shipments for May Climb 5.4 Per Cent Above April

Shipments of pneumatic casings during May, 1938, estimated at 3,372,118 units by the Rubber Manufacturers Association, Inc., show an increase of 5.4 per cent over shipments made in April. Total for the month, however, fell 37.3 per cent below May, 1937.

The association estimates production of pneumatic casings during May at 2,841,549 units, an increase of 5 per cent over April, but 46.9 per cent under May, 1937. Pneumatic casings in the hands of manufacturers May, 31, 1938, are estimated at 9,855,360 units. This is the lowest inventory of tires reported since September, 1936, and represents a decrease of 4.5 per cent under the stocks on hand April 30, and 21.7 per cent under the stocks on hand May 31, 1937.

Shipments of Tractors and Parts For May Down 5 Per Cent

Overseas consignments of tractors and parts during May were valued at $4,345,905, a 5 per cent decline from the corresponding figure for May, 1937, of $4,551,453. The wheel tractor shipments valued at $2,010,426 represented a fractional advance over last year's figure of $1,990,737, whereas the track-type sales were 12 per cent lower, $1,562,698 against $1,786,631 a year ago. In the wheel type, the exports showed a substantial gain in the large sizes (33 and over belt hp.) to $744,152 from $558,796, but were lower in the other two classes, up to 14 belt hp. $80,836 against $85,073, and 15-32 belt hp. $1,185,438 against $1,346,868.

In the tracklaying tractors, the fuel injection type predominated in the shipments abroad, $970,693 compared with $592,005 for the carburetor type. Both figures were lower than a year ago, when these shipments were valued at $1,143,823 and $642,808, respectively. In the fuel injection type, the exports were much more evenly divided over the three-size classes, increasing in the smallest and heaviest sizes and declining in the ordinarily most important size range (35-59 drawbar hp.).

The figures for May, 1938, followed by those for May a year ago, are as follows: Under 35 drawbar hp., $203,253 against $147,562; 35-59 drawbar hp., $305,678 against $539,199; 60 and over drawbar hp., $461,762 against $457,062. In the carburetor type, the smaller sizes (under 35 drawbar hp.) predominated in the shipments as usual, $548,405 against $615,718 a year ago. The exports of parts and accessories for tractors increased to $751,615 from $737,993 in May of last year.

Passenger Car and Truck Production

Downhill movement of production of passenger cars and trucks (U. S. and Canada) brought the May total to 210,183 units, a decrease of approximately 11.7 per cent as compared with the preceding month. Comparison of totals for the five months of 1938 and the similar period, 1937, shows the per cent of decrease to be slightly more than 53.

	May 1938	April 1938	May 1937	Five Months 1938	Five Months 1937
Passenger Cars—U. S. and Canada					
Domestic Market—U. S.	140,239	160,028	400,415	703,752	1,749,470
Foreign Market—U. S.	14,719	16,050	25,017	96,234	126,103
Canada	13,641	14,033	17,980	65,088	78,904
Total	168,599	190,111	443,412	865,074	1,954,477
Trucks—U. S. and Canada					
Domestic Market—U. S.	27,935	31,830	74,398	162,179	337,470
Foreign Market—U. S.	9,175	11,406	17,089	67,042	77,943
Canada	4,474	4,786	5,478	22,338	25,826
Total	41,584	48,022	96,965	251,559	441,239
Total—Domestic Market—U. S.	168,174	191,858	474,813	865,931	2,086,940
Total—Foreign Market—U. S.	23,894	27,456	42,106	163,276	204,046
Total—Canada	18,115	18,819	23,458	87,426	104,730
Total—Cars and Trucks—U. S. and Canada	210,183	238,133	540,377	1,116,633	2,395,716

Ourselves and Government

A weekly check list of legislative, executive and judicial actions affecting the automotive industries. Corrected to June 30.

CONGRESS

Adjourned June 16, *sine die*. All members of House and 36 Senators retire or face election in Autumn.

Legislative Legacies

MONOPOLY INVESTIGATION. Passage of O'Mahoney resolution (S.J. Res. 300) set up temporary National Economic Committee of 12 members to investigate concentration of economic power—monopoly. Committee will include three senators, three representatives, one official each from Departments of Treasury, Justice, Labor and Commerce, one each from Federal Trade and Securities and Exchange Commissions. Senators appointed: O'Mahoney, Borah and King; Representatives: Sumners, Reece and Eicher.

Members of executive agencies on Committee are: Thurman Arnold, assistant attorney general in charge of Anti-trust Division; Richard C. Patterson, assistant Secretary of Commerce; William C. Douglas, chairman, Securities and Exchange Commission (Jerome N. Frank, alternate); Herman Oliphant, general counsel, Treasury Department (Rear Admiral Christian Peoples, alternate); Garland Ferguson, chairman, Federal Trade Commission (Commissioner Ewin L. Davis, alternate).

Investigation will probably begin about Sept. 1. Committee has power of subpoena and $500,000 to spend. Will report to next Congress.

HIGHWAYS. Cartwright Bill to amend the Federal Aid Road Act (H.R. 10140) authorizes appropriations of $158 million for 1940 and $191 million for 1941 to continue the Federal-aid road program. Includes emergency fund of $8 million to replace bridges, etc., damaged by flood. Signed by President June 8.

AIRLINES. Civil Aeronautics Act, 1938, introduced by Senator McCarran (S. 3845) creates a Civil Aeronautics Authority with broad administrative and regulatory powers over air commerce. Includes creation of Air Safety Board. Signed by President June 23, who indicated he will announce appointments before leaving for West, July 7. Mentionees include Edward P. Warner, former assistant secretary of the Navy for Aviation, and past president of the Society of Automotive Engineers.

WAGES & HOURS. Originally introduced by (then) Senator Black of Alabama. (S. 2475) provides for administration by Wage and Hour Division in the Department of Labor, and appointment of Industry Committees to make recommendations for specific industries. Becomes effective in latter part of October and applies to most industries in interstate commerce. Signed by President June 25, becomes effective Oct. 24. President expected to appoint administrator before July 7.

DEPARTMENT OF LABOR

AIRCRAFT LABOR. Walsh-Healey Government Contract Board has given interested persons 14 days (from June 24) in which to object to the proposed minimum wage of 60 cents an hour for a 40-hour week in the aircraft manufacturing industry. Government contracts would be denied manufacturers not adhearing to such standards after approval.

LABOR RELATIONS CASES

Ford vs. N.L.R.B.: Last report A. I., June 25, p. 828.

FISHER BODY. The NLRB has called an election at the Oakland (Calif.) Fisher Body, Oakland parts, and Chevrolet Oakland divisions of the General Motors Corp. to allow 1200 hourly-paid employees to choose between the UAW and an affiliate of the AFofL's machinist union. Or, says the Board, the workers can vote for neither.

CUTLER-HAMMER. The Board has recognized the AFofL's machinist union as exclusive bargaining group at the Cutler-Hammer, Inc., Milwaukee plant, aftermath of the CIO's automobile workers' union defeat at the June 8 election.

SECURITIES COMMISSION

GENERAL MOTORS denied (June 27) confidential status for certain information on executive bonuses filed under Securities Exchange Act (Form 10-K, 1937) Item 10. List of bonuses received by 20 officers and directors of GM during 1937, none exceeding $10,000. Customary for companies to ask for confidential treatment of such matters when filing, and for request to be denied.

TREASURY DEPARTMENT

PROCUREMENT Division has advertised for bids on 129 trucks, 72 tractors and a wide range of road building machinery. Four Government agencies including WPA, FSA and NYA have asked for the equipment.

DEPARTMENT OF JUSTICE

MONOPOLY. Federal Grand Judy in South Bend returned indictments May 28 against approximately 60 executives of General Motors, Ford, and Chrysler; Commercial Credit Co., Universal Credit Co., and General Motors Acceptance Corp., charging conspiracy to violate Sherman anti-trust acts.

Bonds of $2,500 each have been filed by 18 individual defendants connected with General Motors. No action so far by other corporations or individuals indicted. Similar case dismissed in Milwaukee by Federal Judge Geiger Dec. 17 last (see *A.I.*—Jan. 15, 1933. Last detail report *A.I.*—June 11, 1938).

WAR DEPARTMENT

Authorized by Congress to spend two million dollars in next five years for "educational orders" to industry, to facilitate industrial mobilization in time of war. See article p. 804, *A.I.*, June 18. Signature by President pending.

MOTOR CARRIER BUREAU

On June 14 the I.C.C. issued an order postponing effect of previous order relating to maximum hours of service of motor-carrier employes from July 1 to August 1, 1938. (Ex Parte No. MC-2).

FEDERAL TRADE COMM.

INVESTIGATION under the Withrow-Minton Resolution (M.J. Res. 351) proceeding under direction of Dr. Francis Walker of F.T.C. to determine alleged "extent of monopolistic price-fixing and other monopolistic practices engaged in by automobile manufacturers, and alleged extent to which any anti-trust laws are being violated." Field workers interviewing dealers in a number of cities. No information available on progress or duration of investigation.

VS. GENERAL MOTORS on question of forcing dealers to purchase parts and accessories from G.M. sources only. Hearings began July, 1937.

Dealer testimony now being taken in Texas. Hearings will probably shift to New York in July for further testimony. Everett Haycraft is FTC attorney in charge.

ADVERTISING. F.T.C. cited Ford and General Motors in July, 1937, complaining of false and misleading representations in advertising prices of automobiles.

FTC has recently closed its side against General Motors after both Commission and Ford completed their testimony. GM will now present its case and has advised Commission it will not require a great deal of time. Hearing tentatively set for June 29 in New York has been postponed indefinitely.

In Ford case next step is trial examiner's report to FTC, filing of final briefs by FTC and Ford, then final arguments. James M. Hammond is FTC attorney in charge.

Complaint alleges advertising 6 per cent

Passenger Car Production by Wholesale Price Classes

(U.S. and Canada)

Five Months 1938 and 1937 Compared

	Five Months		Per Cent Change	Per Cent of Total	
	1938	1937		1938	1937
Under $750	755,134	1,866,046	− 59.5	87.29	95.48
$751-$1000	95,601	63,768	+ 50.1	11.05	3.26
$1001-$1500	11,498	16,660	− 31.0	1.33	.85
$1501-$2000	1,676	6,171	− 72.8	.19	.32
$2001-$3000	941	1,721	− 45.3	.11	.09
$3001 and over	224	111	+102.0	.03	
Total	865,074	1,954,477	− 55.7	100.00	100.00

Truck Production by Capacities

(U.S. and Canada)

Five Months 1938 and 1937 Compared

	Five Months		Per Cent Change	Per Cent of Total	
	1938	1937		1938	1937
1½ Tons and less	234,622	415,328	− 43.5	93.27	94.13
2 to 3 Tons	8,917	16,427	− 45.8	3.54	3.72
3½ Tons and over	3,843	4,944	− 22.1	1.53	1.12
Special and buses	4,177	4,540	− 7.9	1.66	1.03
Total	251,559	441,239	− 43.0	100.00	100.00

charge on deferred payments by retail purchasers is misrepresentation because no provision is made for amortization.

F.O.B. PRICES case against General Motors and Ford. Hearings will begin after 6 per cent case is closed. Hammond will be FTC attorney in charge. Complaint allege advertising of misleading f.o.b. prices because they do not include all standard equipment, etc.

FAIR TRADE PRACTICE RULES proposed for retail automobile dealers. This code, introduced at public hearing during last NADA meeting in Detroit (see A. I., April 30, 1938) is still under study by FTC fair trade practice division headed by George McCorkle. Procedure: after study by fair trade practice division, rules go to full commission for approval of final draft, after which they will be promulgated and distributed to the trade. No further public hearings contemplated.

MEN OF THE INDUSTRY

KINGSTON FORBES, former chief engineer, Buick Motor Car Div., in charge of styling, special equipment, show exhibits and displays, has opened a consulting office in Detroit, specializing in industrial styling and consultation.

H. B. SPACKMAN has been named vice-president in charge of sales and advertising of Lyon Metal Products, Inc., Aurora, Ill.

A. H. BELFIE, for the past two years manager of the Chicago zone of the Buick Motor division of General Motors Sales Corp., has been named director of merchandising, with headquarters at the Buick home office in Flint, Mich. Mr. Belfie will be assisted by **HUGH H. JOHNSON,** who will continue in his present capacity as operating head of the advertising department. It has also been announced that **C. CRAWFORD EDMONDS,** Pittsburgh zone manager since November, 1934, has been named to succeed Mr. Belfie in the Chicago zone, and that **JOHN G. DAVIES,** assistant zone manager of Buick in Buffalo succeeds Mr. Edmonds at Pittsburgh.

The International Nickel Co., Inc., has issued a bulletin giving 1938 revisions on its data sheets covering compositions and service data on industrial applications of **nickel cast iron.** This bulletin is designated Section 1, No. 1, "Nickel Cast Iron Data."*

A comprehensive report on **"Engine Lubrication and Deterioration"** has been issued by Pines Winterfront Co., Chicago. The study was made by Spitzglass and Zucrow, consulting engineers, who have arranged the subject matter under the following headings: the general problem, emulsion sludge, oxidation sludge, water accumulation in crankcase, crankcase dilution, piston ring sticking, abrasive wear, starting difficulties, and fuel and oil economy.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Reconstructing the 500-Mile Indianapolis Grand Prix

For those many readers of AUTOMOTIVE INDUSTRIES whose olfactory nerves tingle pleasantly when confronted with the odor of "burning bricks" from near or far, we append, herewith, a summary of results of the 500-mile race held May 30 at the Indianapolis Speedway. The data, prepared by the Contest Board of the American Automobile Association, are sufficiently complete to permit mental reconstruction of the entire race. Interested readers, who may have missed the article, are referred to "Four-Cylinder Non-Supercharged Cars Dominate Indianapolis Finish," by Chester S. Ricker which was published in AUTOMOTIVE INDUSTRIES, June 4, page 756.

Summary of Results

Finish Position	Car No.	Driver	Car Name—Specials	Avg. M.P.H.	Oil Used
1	23	Floyd Roberts	Burd Piston Ring	117.20	Gulf SAE 60
2	1	Wilbur Shaw	Shaw	115.58	Gulf SAE 50
3	3	Chet Miller	I. B. E. W.	114.95	Gulf SAE 60
4	2	Ted Horn	Miller-Hartz	112.20	Castor
5	38	Chet Gardner	Burd Piston Ring	110.31	Gilmore Lion Head
6	54	Herb Ardinger*	Offenhauser	109.84 (1)	Gulf
7	45	Harry McQuinn**	Marchese	108.69 (2)	Castor
8	58	Billy De Vore	P. R. & W.	102.06 (3)	Gilmore Lion Head
9	22	Joe Thorne	Thorne Engineering	102.01 (4)	Gulf
10	29	Frank Wearne	Indiana Fur	99.54 (5)	Gilmore Castor

Finish Position	Car No.	Driver	Car Name—Specials	Laps	Miles	Cause of Elimination
11	43	Duke Nalon	Kohlert-Miller	178	445	Flagged 178 Laps
12	12	George Bailey	Duray-Barbasol	166	415	Rear Axle Shaft
13	27	Mauri Rose	I. B. E. W.	165	412½	Broken Connecting Rod
14	16	Ronny Householder	Thorne Sparks	154	385	Burned Valve Supercharger
15	6	Jimmy Snyder	Sparks Thorne	150	375	Burned Valve Supercharger
16	5	Louis Meyer	Bowes Seal Fast	149	372½	Broken Piston
17	17	Tony Gulotta	Hamilton-Harris	130	325	Broken Connecting Rod Bolt
18	55	Al Miller	Domonts Pepsi Cola	125	312½	Clutch Trouble
19	15	George Connor	Marks-Miller	119	297½	Connecting Rod Bearing Out
20	9	Cliff Bergere	Kratts Real Rye	111	277½	Broken Wrist Pin
21	33	Henry Banks	Kimmel	109	272½	Connecting Rod Bearing Out
22	35	Kelly Petillo	Petillo	100	250	Cam Shaft Bearing Out
23	21	Louis Tomei	P. O. B. Perfect Seal	88	220	Broken Connecting Rod
24	7	Bill Cummings	I. B. E. W.	72	180	Radiator Trouble
25	14	Russ Snowberger	D-X	56	140	Broken Connecting Rod
26	34	Babe Stapp	McCoy Auto Service	54	135	Broken Valve
27	10	Tony Willman	Belanger	47	117½	Broken Valve
28	8	Rex Mays	Alta Romeo	45	112½	Broken Valve
29	42	Emil Andres	Elgin Piston Pin	45	112½	Wrecked 46th Lap
30	37	Ira Hall	Greenfield Super Service	44	110	Spin North Turn
31	26	Frank Brisko	Shur Stop Mechanics Brake Equalizer	39	97½	Broken Oil Line
32	36	Al Putnam	Troy Tydol	15	37½	Broken Crank Shart
33	47	Shorty Cantlon	Kamms	13	32½	Supercharger Trouble
34	31	Chas. Crawford	Shafer Eight	Alternate		

*—Relief drivers—Snowberger, Bergere
**—Relief driver—Tony Willman

Flagged before completing full distance due to rain as follows: (1) 497½, (2) 492½ (3) 462½, (4) 462½, (5) 452½.

Distance-Speed-Position Chart

Distance	Speed	Position or Cars (first 15)														
25 Miles	119.84	8	6	16	23	7	34	17	14	2	1	3	38	29	27	21
50	120.27	6	8	16	7	23	14	2	34	17	1	3	29	38	27	35
75	120.20	6	8	16	23	14	2	34	1	3	17	38	29	35	27	21
100	120.25	6	8	16	23	14	2	1	34	35	3	17	27	38	29	21
125	119.98	6	16	23	14	35	1	34	3	38	17	27	21	29	15	55
150	120.03	6	16	23	35	1	3	38	17	21	29	5	15	55	27	2
175	119.90	6	23	35	1	3	38	17	21	16	29	5	15	55	27	2
200	118.86	23	35	1	6	3	38	21	5	16	29	27	15	55	2	45
225	119.06	23	35	1	6	5	3	16	38	27	2	29	15	55	17	22
250	118.95	23	1	6	5	16	38	3	27	29	17	2	35	15	45	55
275	117.47	23	6	1	16	38	5	3	29	27	17	2	15	45	55	22
300	117.62	6	23	16	5	3	1	29	27	2	17	45	54	22	38	12
325	117.76	6	23	16	5	3	1	27	2	29	17	45	22	38	54	12
350	117.95	6	23	16	3	1	2	27	29	45	22	5	38	54	12	58
375	117.80	23	6	16	3	1	2	27	45	22	38	54	12	58	29	43
400	117.72	23	3	1	2	27	45	38	22	54	12	58	29	43	16	
425	117.65	23	3	1	2	38	54	45	58	22	29	43	12	27		
450	117.55	23	3	1	2	38	54	45	58	22	29	43				
475	117.43	23	3	1	2	38	54	45	58	22	29					
500	117.20	23	1	3	2	38	54*	45*								

*—Flagged before completing 500-mile Race

BUSINESS IN BRIEF

Written by the Guaranty Trust Co., New York

General business activity showed further gains last week. This upturn, together with other developments in commercial and financial markets, brought about a more optimistic tone in various quarters. Basic commodity prices, particularly metals, have become firmer. Textile markets are reported to be widening. Both inquiries and orders in some important industries are more active.

Railway freight loadings increased slightly during the week ended June 18, totaling 555,569 cars and showing a rise of 1715 cars, or 0.3 per cent, above the figure for the preceding week. The current total is, however, 197,218 cars, or 26.2 per cent, below that for the corresponding period last year.

Production of electricity by the electric light and power industry of the United States for the week ended June 18 is estimated to have been practically equal to the total for the preceding week and 10.1 per cent below that for a year ago. A week earlier the decline below last year's corresponding figure amounted to 10 per cent. These declines are the smallest since the middle of April.

Average daily crude oil production for the week ended June 18 is estimated at 3,137,300 barrels, showing an increase of 5800 barrels above the output for the preceding week but a sharp decline below the average of 3,510,950 barrels for the corresponding period last year. The total of restrictions imposed by the various oil-producing States for June is estimated at 3,333,300 barrels daily.

The index of business activity of the Guaranty Trust Co. for May stands at 65.6, as against 67.2 for April and 95.7 for May of last year. The current figure is the lowest since November, 1934. The Guaranty Trust Co.'s wholesale price index for June 15 stands at 60.4 per cent of the 1926 average, the lowest since the beginning of 1934, as against 61.8 on May 15, 1938, and 84.8 on June 15, 1937.

Professor Fisher's index of wholesale commodity prices for the week ended June 25 stands at 81.1, showing the third successive weekly advance. The current figure compares with 81.0 for the preceding week, 80.7 two weeks earlier, and 80.5 three weeks earlier.

Reserves of member banks of the Federal Reserve System increased $18,000,000 during the week ended June 22. The monetary gold stock rose $7,000,000, while Reserve bank credit outstanding declined $7,000,000 and the amount of money in circulation decreased $18,000,000. Excess reserves of member banks on June 22 were estimated to be approximately $2,780,000,000, showing an increase of $50,000,000 for the week.

U. S. Exports of Rubber Products Down 12.5 Per Cent in '38

United States exports of rubber products in the first four months of 1938 shrank 12.5 per cent from the figures for the corresponding period of 1937 while U. S. imports of rubber products decreased 44.7 per cent.

Total U. S. rubber goods exports had a dollar value of $8,875,482 for the first four months of 1938 compared with $10,144,615 a year ago. Tire exports were $4,426,027 compared with $5,024,857. Belting, hose and packing exports were $1,459,452 this year against $1,780,231 a year ago. The only increase was in rubberized fabrics which increased from $368,921 a year ago to $375,190 this year.

U. S. imports of rubber goods dropped from $743,618 last year to $411,078 this year.

Monthly Motor Vehicle Production—U. S. and Canada

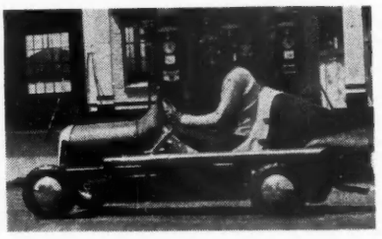
	Passenger Cars		Trucks		Total Motor Vehicles	
	1938	1937	1938	1937	1938	1937
January	168,890	324,191	58,240	74,995	227,130	399,186
February	151,133	310,961	51,456	72,939	202,589	383,900
March	186,341	423,006	52,257	96,016	238,598	519,022
April	190,111	452,907	43,236	100,324	238,133	553,231
May	159,599	443,412	41,584	96,965	201,183	540,377
June		429,333		91,820		521,153
July		372,913		83,996		456,909
August		317,270		87,802		405,072
September		120,597		55,033		175,630
October		306,040		31,939		337,979
November		309,121		67,508		376,629
December		258,769		88,117		346,886
Total		4,068,520		947,454		5,015,974

Letters to Automotive Industries

Editor, Automotive Industries:

In your April 9, 1938 issue of the Automotive Industries, page 500, I noticed the article about a midget auto that was built by Mr. G. E. Stauffer of the Muskegon Piston Ring Co.

I am a machinist at the Hall-Scott Motor Car Co. in Berkeley, Calif., and in my spare



time during the past two years, I built a small midget racing car for my son, and enclose two pictures of same.

My car has a 1 cylinder, 4-cycle engine, full throttle at 40 to 45 m.p.h., 3-speed transmission, chain drive all the way, foot clutch, foot accelerator, internal brakes, weighs 355 lb. and will go 60 miles on a gallon of gasoline. It has 4-in. tires and a 52-in. wheelbase. It is chromium plated all the way through and cost me $200 to build. It is built entirely on racing car principles.

I agree with Mr. Stauffer that more men should build midget racing cars as a hobby as I received a lot of pleasure designing and building this car.

Albert Blazic, Sr.,
Oakland, Calif.

The Alfa-Romeo Diesel Engine

Editor, Automotive Industries:

Your description of the Alfa-Romeo two-stroke Diesel engine, in your issue of June 11, is most interesting. For one thing, it is the first attempt on the part of Italian Diesel-engine designers to break away from foreign influence. As you know, all their automotive engines have so far been built under license, Fiat licensed by Ricardo, Lancia by Junkers, and Alfa-Romeo by Deutz.

More interesting to me personally is the strong resemblance of this combustion system and output control gear to that of the Attendu engine, purchased by the Navy Aeronautics in 1925.[1] The bowl-shaped piston cavity and the offset injector are very similar to that used by Attendu (and further developed in the Leyland engines.), while the oil-controlled output governor

is Attendu to the last detail. Attendu did not use the governor to control the fuel input; this falling delivery curve was a characteristic of our injection pump.

This must not be taken as in any way detracting from the excellence of the Alfa-Romeo design. It is obviously Italian in its neat arrangement and detail finish. Above all, it indicates a widening interest in the merits of the two-stroke Diesel engine for automotive, and, no doubt, eventually for aircraft (even fighting aircraft) use.

P. E. BIGGAR,
M.S.A.E., M.I.A.E.

[1] S.A.E. Journal, Feb., 1926.

More About "C. R."

Editor, AUTOMOTIVE INDUSTRIES:

From time to time in AUTOMOTIVE INDUSTRIES I note remarks concerning Consumers Research. This week I read with much interest the letter by a man from Wilmington. Mr. Loewe. It may be of interest to you to know that others in the automotive industry are also members. I agree with every word Mr. Loewe said. You should pass the word along. A number of my friends find C. R. a fine investment too.

As for the YY model of 1935, may I say I had one which leaked every mile of the 15,000 I drove it. Being another case of where C. R. is right. At present I drive a 1937 model which C. R. takes apart and though my whole life and heart is in the making of that car I must admit it is just as they have said.

KENNETH E. WALL.

Telephones For Motorists

Two-way radio telephone communication between a moving vehicle and central station telephone subscribers was demonstrated at the Paris Fair (which ended June 6), by M. Gassman, who received the prize of the president of the French Republic for his invention.

According to the correspondent the inventor uses a 20-meter wave. The conventional telephone dial is used to call central from the moving vehicle, and dial telephones connected with the central station may be reached automatically.

Communication from the ordinary stationary telephone is made by dialing the proper number. The telematic signals are relayed from central and picked up by the moving vehicle, in which a signal is made.

Distances of several miles have been covered experimentally.

AUTOMOTIVE ABSTRACTS

French Production in 1937

Monthly reports on the number of new vehicles registered in France permit of an estimate of the number of cars produced in that country, except for the fact that this method does not take account of variations in the stocks of manufacturers and dealers. Starting with the total number of sales in France, the number of cars exported is added and the number of cars imported subtracted.

In 1937 the total number of passenger cars sold in France was 163,967; the number exported, 19,787; the number imported, 1054, and thus the number produced, 182,700. This is a slight reduction from 1936, when 185,234 were produced. The number of motor trucks sold in France in 1937 was 21,031; the number exported 3725; the number imported, 730, and the domestic production, therefore, 24,026, which is very slightly less than the number produced in 1936, viz., 24,105. The number of motorcycles sold in France in 1937 was 12,522; the number exported, 1580, and the number imported, 665, which makes the French production for the year, 13,437. This compares with 18,910 for 1936 and 43,907 for 1931. This confirms the recent report that sales of motorcycles to private individuals in France are declining rapidly and production is being sustained only by increased use of such machines by the Army.

Since 1935 the statistics permit of separating passenger vehicles into private vehicles and public-service vehicles. In 1937 there were registered 2178 new buses and sightseeing cars, of which 2115 were of French and 63 of non-French production. The Customs Department does not distinguish between private and public vehicles exported and imported, and it is, therefore, impossible to calculate the French production of commercial passenger vehicles.

Statistics based on car registrations now permit of distinguishing between new and used cars. Sales of used cars of French production increased from 324,495 in 1936 to 371,559 in 1937; sales of used trucks of French production from 33,870 to 39,473; sales of used motorcycles of French production from 65,369 to 79,510; sales of used cars of foreign production from 15,007 to 15,403; sales of used trucks of foreign production from 4667 to 4744, and sales of used motorcycles of foreign production from 3452 to 4067. For 100 sales of new private passenger cars, 236 used cars were sold in 1937 (against 201 in 1936, 217 in 1935, and 199 in 1934). On the other hand, for every 100 new motor buses and motor sight-seeing cars sold in 1937, 94 used buses and sight-seeing cars were sold.—*Bulletin de la Statistique de la France* for the January-March Quarter.

The French Air Service Discards the "Cheval"

The French Air Service some time ago decided to adopt the standards of measurement which were made legal in France by the law of April 2, 1919. No more will the power of aircraft engines be expressed in horsepowers of 75 kilogram-metres per second, the new unit being the kilowatt. A French writer commenting on the change says no one will regret the disappearance of the "cheval" (horsepower), which some abbreviated "ch." and others C.V., while still others used the British abbreviation H.P., even though the French official horsepower differed considerably in magnitude from the British unit of the same name. Pressures are to be expressed hereafter in pieze and heptopieze. On all of the new aircraft instruments the new units are used, the scales of manifold-pressure gages being divided into piezes and those of oil-pressure gages into heptopiezes. Forces will hereafter be expressed in sthenes instead of in kilogrammes.—*La Technique Moderne* for June 1.

SWAMPS and sand wastes can be traversed with this new 135-in. wheelbase "Marsh Buggy" built by the Marmon-Herrington Co., Inc., of Indianapolis, Ind. Powered by an 85-hp. Ford V-8 engine, the all-wheel-drive unit has 13.50 by 24 tires mounted, front and rear, on spoke type disc wheels.

International Harvester Closes Two Plants Until End of July

International Harvester Co. has announced the closing of its Milwaukee factory and its Farmall plant at Rock Island, Ill. The two plants will be closed until the end of July. Reason for the closing is said to be to prevent further accumulation of inventories and to permit the company to get workers' paid vacations out of the way. The company is reported to be considering closing for two weeks several of its other plants, including some in Chicago. About 4000 are employed at Milwaukee and 1200 at Rock Island.

Owosso Parts Co. Trying Unique Employer-Employe Plan

Workers are guaranteed an annual living wage, steady employment and a share in earnings in an employer-employe plan announced by the Owosso Parts Co., a newly formed automotive parts manufacturing company in Owosso, Mich.

The new company has taken over the automotive parts business of the A. G. Redmond Co., Flint, which is now concentrating on the production of small electric motors. It is headed by Ralph Redmond, former secretary and sales manager of the A. G. Redmond Co.

The plan is described in a booklet addressed to "All former employes of the A. G. Redmond Co.," and signed by A. G. Redmond, president of the latter firm, who said he is not connected with the new firm.

His description says: "Briefly, the wage plan consists of a flexible agreement designed to give every worker a guaranteed living wage, with the provision that before any earnings are taken out of the enterprise by the owners, the workers will receive an additional sum up to 20 per cent of their earnings for the year. In addition, if there are any funds available after the 20 per cent increase, then any sum taken out of the business by the owners would be divided half and half until the worker's share adds 30 per cent to his guaranteed wage." The minimum guaranteed wage was not announced.

When formation of the new company was announced, UAW members had picketed the A. G. Redmond plant in Flint to prevent removal of machinery. The dispute ended by an agreement to make jobs in the new plant available to A. G. Redmond employes.

TOOLS OF TOMORROW

D. A. Wallace, president, Chrysler Sales Corp., recently presented to members of the Associated Tool Dealers of America his ideas on "What the Machine Tool Buyer Wants to Know from the Machine Tool Seller." Some of Mr. Wallace's observations on what buyers require from a physical angle in their machine tools were as follows: "If some simple type of screw or belt conveyor could be properly fitted into the machine so that chips, turnings and borings could be delivered into a container that is easily and rapidly removable, it would be of great value and would present a much neater appearance around the machine and in the shop, and at the same time reduce overhead costs. . . . The filtering of solutions and removal of the residue certainly has not been solved. Equipment, such as grinders, that have this problem do not have facilities for filtering the solutions sufficiently to eliminate wearing of the machines and parts where the solution is used and the removal of the residue from the machine is usually a sloppy, dirty job and presents a problem to be solved by someone in a more satisfactory manner . . . and . . . in these days when many shops require yearly movement of the machine tool equipment it is very desirable that machine tools be designed and built with hooks, holes, etc., to which chain and tackle can quickly be attached."

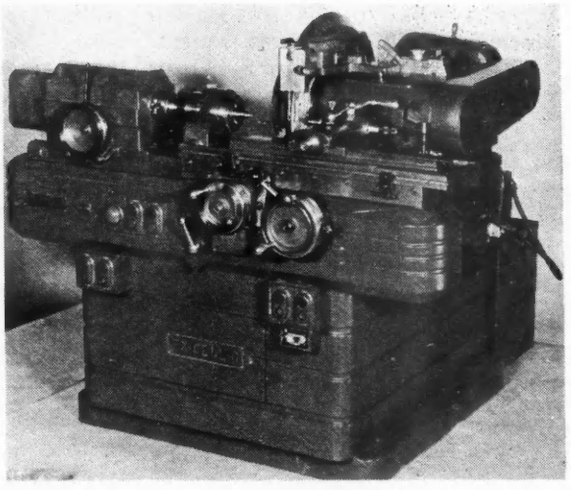
Thread Grinders

. . . Ex-Cell-O incorporates improvements and refinements in series No. 31 precision machines

To increase flexibility, productivity and accuracy in precision grinding of threads in regular production, Ex-Cell-O Corp. recently incorporated a large number of improvements and refinements in its series No. 31 precision thread grinders.

Among the new features are such items as a newly developed built-in taper grinding attachment, an increase in the number of grinding wheel speeds, provision for using grinding wheels from 12 to 18 in. diameter, a new electrical system for increased flexibility of operation, and improved coolant system for closer temperature control.

Other machine features include: Heavily ribbed base with $\frac{5}{8}$ in. minimum wall thickness to insure rigidity; hardened and ground alloy steel precision wheel spindle; hand lever for quickly disengaging wheel from the work at the end of the cut; hardened and precision ground lead screws with split bronze nuts to permit taking up for wear—with lead screw reversible in its mounting to further distribute wear evenly over



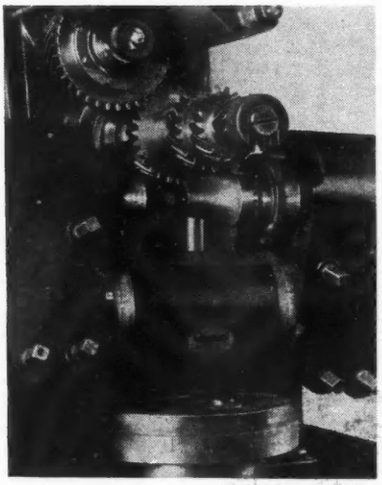
Ex-Cell-O No. 31 precision thread grinder

the entire screw; positioning device on work head for quick locating of previously roughed threads in relation to the grinding wheel; horizontally adjustable hardened and ground V-shaped steel ways for the table, which rides on hardened, ground, and lapped steel rollers; work spindle nose provided with tapped holes for attaching indexing fixtures, etc.

Burring

. . . Cimatool's latest machine burrs gear teeth at speeds up to 800 teeth per minute

To accurately burr gear teeth at speeds up to 800 teeth per min., the Cimatool Co., Dayton, Ohio, has engineered its new No. 2B burring machine. Utilizing a fly cutter on each of two cutter spindles, the



Close-up view of Cimatool No. 2B burring machine

model No. 2B will burr both sides or front and back of gear teeth on gears up to 8 in. O.D. Other model machines are available for other size gears. The main drive is multiple Vee belt, and speed changes are rapidly made by changing pulleys.

The main drive revolves two trains of constant mesh gears, one of which drives the two cutter spindles mounted on a vertical column (vertically adjustable 3¾ in.) in the center of the machine in which the cutter spindle driveshaft is enclosed. The cutter spindles are mounted horizontally and opposed, and each may be adjusted laterally toward and away from each other 1½ in. and from front to rear through a 60 deg. arc to obtain practically any burred gear tooth face within machine capacity. The quick change "timing" adjust-

(Turn to page 31, please)

Labor

(Continued from page 1)

members with the threat of drastic action at the next UAW convention if they do not act to compose their differences and bring about peace within the official family.

Martin supporters are reported to have deprecated the action of the group of locals' presidents, claiming that their demands that the suspended officers be reinstated indicate merely another phase of the activities of the group supporting those suspended. On the other hand the group making the demands announced that it was securing the signatures of presidents of many other UAW locals in other parts of the country to its petitions, and that their sole concern was preservation of the union and continuation of the program which has been crippled by the factional fight.

Emil Mazey, president of Briggs Local No. 212, and one of the active participants in the peace program, said the group's program differed from that of the anti-Martin faction "in that we feel immediate reinstatement is necessary to avoid a special convention which would cause further dissension when we need peace.

"We are not taking sides in the matter," he said. "We want peace right away so the union can fight its proper battles."

Filing of actual charges against the suspended officers is expected to be announced by Martin, but as this is being written, they were still said to be in preparation, although the men were suspended early in June.

Calendar of Coming Events

CONVENTIONS AND MEETINGS

National Petroleum Association Meeting, Atlantic City, N. J.....Sept. 14-16
Seventh International Management Congress, Washington .....Sept. 19-23
SAE National Regional Fuel and Lubricants Meeting, Tulsa, Okla..Oct. 6-7
SAE National Aircraft Production Meeting, Los Angeles, Calif...Oct. 13-15
American Welding Society Meeting, Detroit .....Oct. 17-21
SAE Annual Dinner, New York....Nov. 14
SAE National Transportation Engineering Meeting, Commodore Hotel, New York .....Nov. 14-16
National Safety Council Meeting, Chicago .....Nov. 14-18
American Petroleum Institute Meeting, Chicago .....Nov. 14-18
National Industrial Traffic League Meeting, New York .....Nov. 17-18
Automotive Service Industries Show, Chicago .....Dec. 5-10
*National Standard Parts Association Meeting, Chicago .....Dec. 2-3

SHOWS

New York, National Motor Truck Show, Nov. 11-17
New York, National Automobile Show, Nov. 11-18
Pittsburgh, Pa., Automobile Show, Nov. 11-18
Detroit, Mich., Automobile Show, Nov. 11-19
Columbus, Ohio, Automobile Show, Nov. 12-18
Buffalo, N. Y., Automobile Show..Nov. 12-19
Chicago, Ill., Automobile Show..Nov. 12-19
Milwaukee, Wis., Automobile Show, Nov. 12-19
Minneapolis, Minn., Automobile Show, Nov. 12-19
*Philadelphia, Pa., Automobile Show, Nov. 12-19
*San Francisco, Calif., Automobile Show .....Nov. 12-19
Los Angeles, Calif., Automobile Show, Nov. 12-20
*St. Louis, Mo., Automobile Show, Nov. 12-20
*Elmira, N. Y., Automobile Show, Nov. 14-19
New Haven, Conn., Automobile Show, Nov. 14-19
Baltimore, Md., Automobile Show, Nov. 19-26
Rochester, N. Y., Automobile Show, Nov. 19-26
Montreal, Canada, Automobile Show, Nov. 19-26
*Washington, D. C., Automobile Show, Nov. 19-26
*Cincinnati, Ohio, Automobile Show, Nov. 20-26
Newark, N. J., Automobile Show, Nov. 26-Dec. 3
Denver, Colo., Automobile Show, Dec. 5-10

*Tentative

British To Purchase 200 Lockheed Bombers

Confirming recent announcements from London, Lockheed Aircraft Corp. this week announced that all details for the arrangement for the purchase of 200 reconnaissance bombing planes by the British Air Ministry had been completed and the formal contract signed.

Chevrolet Dealer Committees Meet for Monthly Session

Current trends in business, with special reference to their bearing on automobile sales, were discussed this week at the regular monthly meeting of Chevrolet's National Dealer Planning Committee and National Dealer Used Car Committee, in the General Motors Building, Detroit.

Each of the two committees comprises nine members, each of whom is chosen by the dealers in his region to represent them at the Detroit monthly session. Suggestions and recommendations bearing on the conduct of the business are laid before sales department executives in a series of round-table discussions. The system is devised to keep Chevrolet in close touch at all times with conditions throughout the retail field.

W. E. Holler, general sales manager, inaugurated the company's "Quality Dealer" program and the dealer committee organization which is an integral part of it.

Exacting Diesel Production

with a diversity of operations, has brought about an effective coordination of manufacturing methods and design engineering at the Caterpillar plant

By JOSEPH GESCHELIN

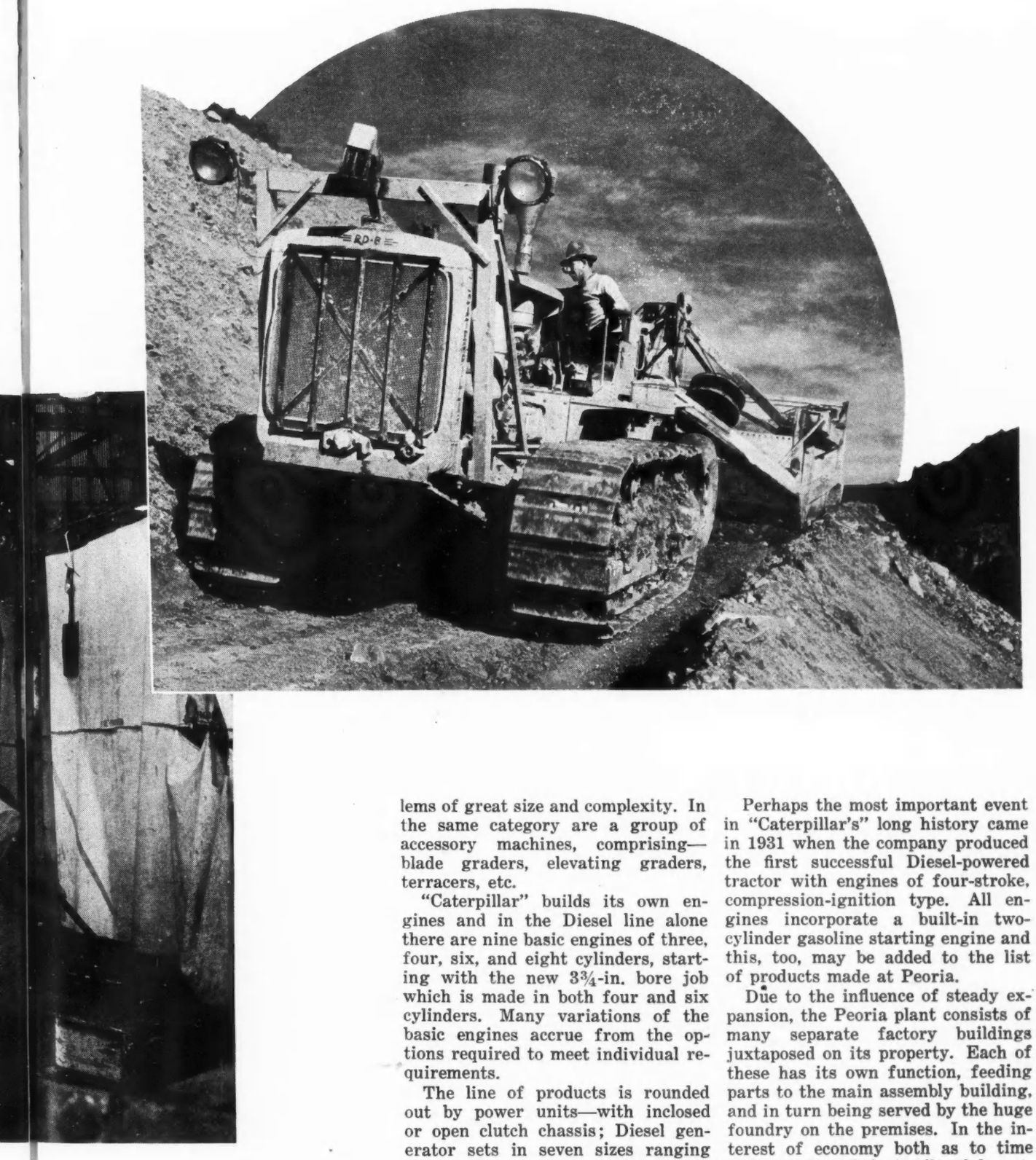
TOYING with farm chores—harnessing turbulent waters—building roads through the wilds—retrieving the forest giants of the north woods—these are but a few of the tasks to which the giant "Caterpillar"-built tractors are applied.

Home of the Caterpillar Tractor Co. is in Peoria, Ill., where modern factory buildings cluster on a property extending 151 acres, roofing 63½ acres with a floor space of 2,765,348 sq. ft. Another plant at San Leandro, Calif., produces service parts and many non-current parts as an aid to quick service in the far flung territory on the West Coast. San Leandro also centers the production of all Diesel fuel pumps and injectors used on "Caterpillar" Diesel engines.

The manufacturing problem may be best gaged by considering the extent of applications and product. First there is the basic line of five Diesel-powered tractors ranging in drawbar rating from 25.5 to 95 hp., and from 6525 lb. to 32,600 lb. in weight. Although Diesel power constitutes over 90 per cent of "Caterpillar" production, there is a supple-

Welding—both torch and the electric arc—are major assembly operations here. This view taken in a welding booth in the road machinery plant shows an operator completing the quality weld on Auto-Patrol circle frame. Operators are equipped with safety helmets and other safety devices.

View in spacious engineering laboratory with dynamometer stands in the foreground.



mentary line of three basic sizes of gasoline-powered tractors, including the versatile "Twenty-two" model.

A line of "Auto Patrols," wheel type road building machinery, Diesel or gasoline powered, invites problems of great size and complexity. In the same category are a group of accessory machines, comprising—blade graders, elevating graders, terracers, etc.

"Caterpillar" builds its own engines and in the Diesel line alone there are nine basic engines of three, four, six, and eight cylinders, starting with the new 3¾-in. bore job which is made in both four and six cylinders. Many variations of the basic engines accrue from the options required to meet individual requirements.

The line of products is rounded out by power units—with inclosed or open clutch chassis; Diesel generator sets in seven sizes ranging from 20 kw. to 80 kw., and a variety of special attachments for power units and tractors.

Perhaps the most important event in "Caterpillar's" long history came in 1931 when the company produced the first successful Diesel-powered tractor with engines of four-stroke, compression-ignition type. All engines incorporate a built-in two-cylinder gasoline starting engine and this, too, may be added to the list of products made at Peoria.

Due to the influence of steady expansion, the Peoria plant consists of many separate factory buildings juxtaposed on its property. Each of these has its own function, feeding parts to the main assembly building, and in turn being served by the huge foundry on the premises. In the interest of economy both as to time and cost, the whole family of departments is closely knit by an industrial railroad system whose tracks trav-

THIS IS THE TWENTY-SEVENTH IN THE SERIES OF MONTHLY PRODUCTION FEATURES

Factory Personnel

T. J. Connor	Vice-president Administering, Manufacturing, Purchasing and Engineering
Manuel Rogers	General Factory Manager
J. R. Munro	Factory Manager Tractor Division
B. B. Gracier	Factory Manager Road Machinery Division
M. J. Gregory	Factory Manager Foundry Division
J. E. Murphy	Production Manager
G. C. Riegel	Chief Metallurgist
C. E. Armstrong	Plant Engineer
M. D. Johnson	Chief Inspector
C. H. Lage	Supervisor Mechanical Division Tractor Planning

lines, cranes of various capacities for handling tools, dies, and heavy parts; and hoists of both electric and pneumatic type. Rather unique is the use of overhead monorails fitted with a multiplicity of hand-operated hoists. This takes the place of the mechanically driven conveyors found in mass production plants.

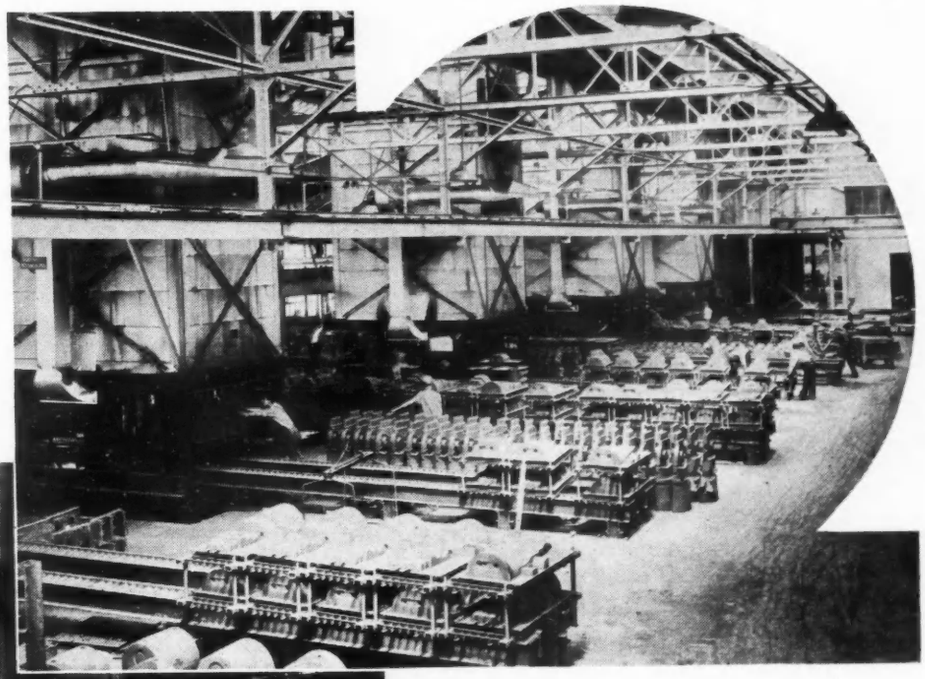
Apart from the manufacture of Diesel fuel systems, easily the most exacting work to be found in modern production, the most interesting activity is that of piston ring manufacture and interconnect every building. "Caterpillar" track-type tractors with rubber cleated tracks serve as locomotives.

Within departments, materials handling is facilitated by the use of gravity roll conveyors in the machine

(Left) Caterpillar maintains complete facilities for making its own tools and dies, and pattern equipment. This is a general view of the pattern shop.

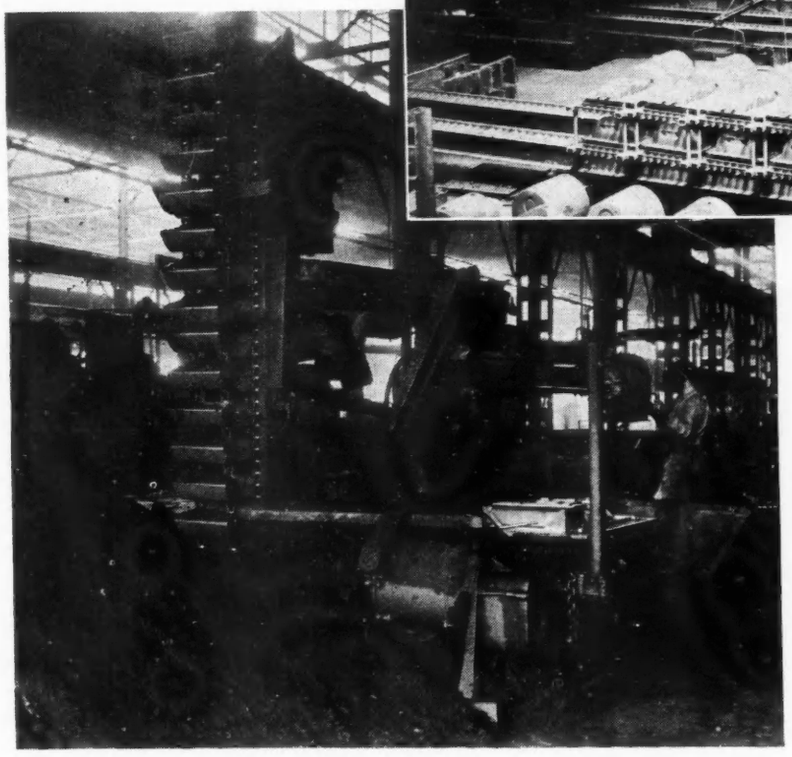
Factory Routing—Cylinder Block

OPERATION	EQUIPMENT
Mill top, bottom straight side and both ends	Newton double end milling machine
Coredrill oil pump hole and drill and ream locating holes in bottom	American radial drill
Mill angular side, top and sides of bearing locks and straddle mill bearing locks	Newton combination drill
Rough and finish bore liner holes	W. F. & John Barnes 5-spindle vertical cylinder boring machine
Drill all holes in angular side and drill holes in rear end and top	3-way Natco multiple drill
Drill holes in straight side and remaining holes in top	2-way Natco multiple drill
Drill all holes in front end, remaining holes in bottom	3-way Natco multiple drill
Drill and counterdrill remaining holes and ream 5 holes in bottom	3-way Natco multiple drill
Rough and finish bore oil pump hole and drill 6 holes in straight side	"Caterpillar" special drilling and boring machine
Tap stud holes and backface 2 holes	Cincinnati-Bickford radial drill
Counterdrill, ream and tap all holes in straight	Cincinnati-Bickford radial drill
Tap stud holes and ream dowel holes in top	Cincinnati-Bickford radial drill
Drill and ream large hole and ream and tap all holes in rear end and tap pipe tapped hole in angular side	Cincinnati-Bickford radial drill
Ream and tap all holes in front end and tap small holes in angular side	Cincinnati-Bickford radial drill
Tap all flange holes and finish ream dowel holes in bottom	Cincinnati-Bickford radial drill
Wash	"Caterpillar" special washer
Assemble and tighten screws and assemble caps	Conveyor
Rough bore main bearings and rough bore camshaft holes	W. F. & John Barnes horizontal single end boring machine
Finish bore main bearings and finish bore camshaft holes	W. F. & John Barnes horizontal single end boring machine
Wash and clean	"Caterpillar" special washing machine
Remove bearing caps, chamfer dowel holes and assemble dowels in main bearings and main bearing cap and assemble in block	Conveyor
Drive head studs	Conveyor
Finish ream and counterbore cylinder holes and assemble gaskets, seals, liners and plug	Conveyor
Water test at 60 lb. pressure	Conveyor
Press in camshaft bushings and plug	Bench



(Right) Some idea of the size of the foundry may be gained from this view of one of the two core rooms. This section equipped with a battery of five D.S.M. vertical core ovens takes care of large core production.

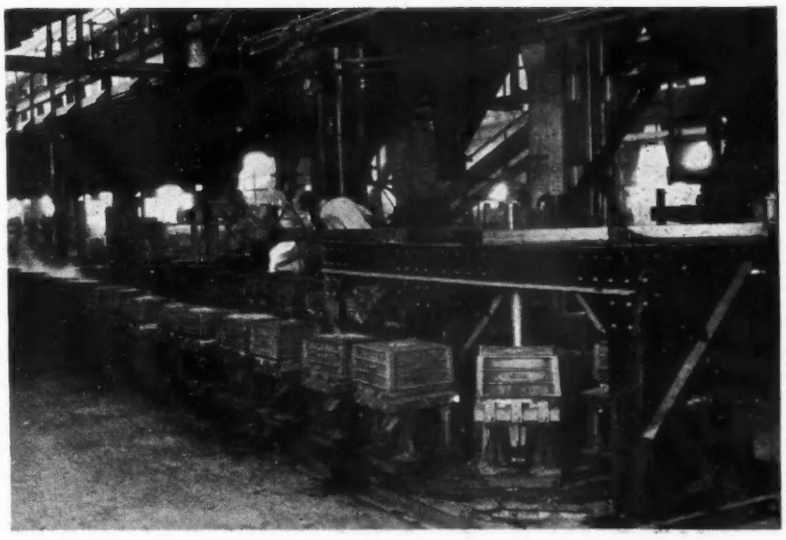
(Below) Close-up of big sand-slinger in foundry.



ceeds that of similar equipment in automotive plants. In this category will be found the big Norton cylindrical grinder built for the large six-cylinder Diesel crankshaft—the Fellows gear shaper used for finishing bull ring gears around 27 in. in diameter and 1 in. diametrical pitch—the unit type Newton milling machine, said to be the first of its kind—and many others.

A new program of production development under way during the past year bids fair to change the picture quite radically. As will be described later, a more intimate re-

(Below) One of the mechanized pouring lines—a merry-go-round power driven conveyor in the foundry.



facture. It was surprising to us to find piston rings being made here and we were told that this was the only solution to their problem in building Diesel engines. Too, "Caterpillar" has found it necessary to rely upon its own resources for tools, dies, and fixtures, and operates a complete tool and die shop for this purpose.

In many respects the variety of products makes it necessary to rely upon the universal types of manufacturing equipment. Nevertheless, there has been a keynote of modernity throughout, best exemplified by the use of unit-type machines for many important operations. Some of the product is of such huge size that it has been necessary to install machines whose physical bulk ex-

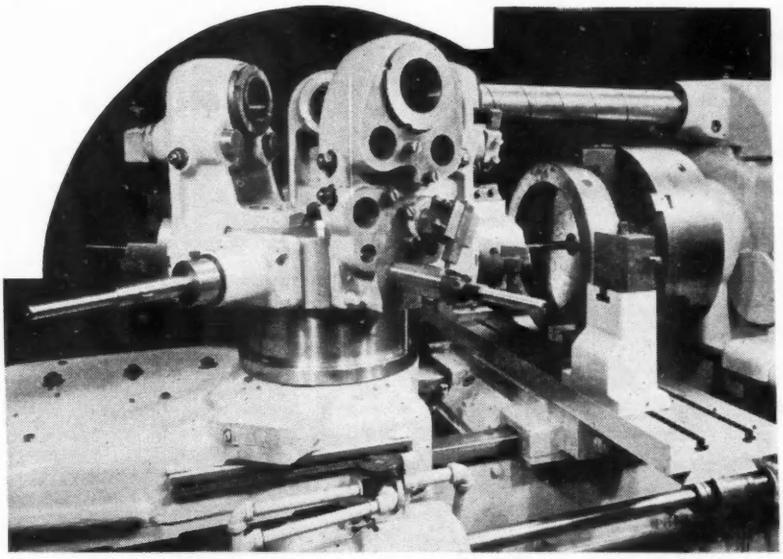
Factory Routing—Cylinder Block Starting Engine

OPERATION	EQUIPMENT
Mill top and bottom both sides of both ends	Newton heavy duty double end milling machine —6-spindle special
Mill camshaft and idler shaft bosses	No. 2 M Cincinnati vertical milling machine
Rough bore right hand cylinder bore	No. B225H Natco heavy duty drill special
Rough bore left hand cylinder bore	No. B225H Natco heavy duty drill special
Chamfer both cylinder bores	"Caterpillar" special 21 in. Cincinnati-Bickford boring and drilling machine—1-spindle special
Finish bore right hand cylinder bore	No. B225H Natco heavy duty drill special
Finish bore left hand cylinder bore	No. B225H Natco heavy duty drill special
Rough and semi-finish bore camshaft diameter in front side and rough and finish bore large and small main bearing diameter	No. 2BH Natco heavy duty drill special
Turn, bore and face oil seal, rough and semi-finish bore camshaft diameter in rear side and rough and finish bore idler shaft diameter	No. 2BH Natco heavy duty drill special
Drill holes in front and rear sides	No. 2BH Natco 14x22 in. hydraulic multiple drill —24-spindle special
Drill all holes in top and bottom except dowel holes	No. 2BH Natco 14x22 in. hydraulic multiple drill —24-spindle special
Drill (7) 5/16 in. holes in right and left ends	No. B225H Natco 10x16 in. hydraulic multiple drill 20-spindle special
Coredrill valve guide holes	No. B225H Natco heavy duty drill special
Coredrill tappet guide holes	No. B225H Natco heavy duty drill special
Drill, bore, counterbore, ream and seat valve holes	"Caterpillar" special 21 in. Cincinnati-Bickford boring and drill machine 1-spindle special
Coredrill and ream (1) core plug hole, drill and ream 1 idler shaft cross hole and drill and ream 2 dowel holes in bottom tap 15 holes in rear side, drill and ream 2 dowel holes, tap 10 holes in front side, slide out and backface 6 holes in bottom	Type D-3½ ft. Hammond sensitive radial drill
Tap 16 holes in top, drill (2) 40 deg. angular drain holes in valve bores, drill, spotface and tap (1) 18 deg. angular oil connecting hole in each end, tap 7 cylinder head bolt holes and drill 1 water hole in each end, drill and tap (1) 7½ deg. angular connecting hole in valve chamber of opposite end, countersink (4) 2 3/32 in. diameter 8 deg. angular valve clearance and backface 2 valve guide bores at 8 deg., drill and tap (1) 7½ deg. angular oil connecting hole in valve chamber of opposite end, drill and ream (1) 38 deg. x 4 deg. - 30 min. Angular oil level gauge hole, drill (2) 40 deg. angular drain holes in valve bores.	4 ft. Cincinnati-Bickford Radial (9 in. column) drill
Hone cylinder bores	No. 306H Barnes twin-cylinder hydraulic honing machine—1 - spindle special
Polish cylinder bore	No. 306H Barnes twin-cylinder hydraulic honing machine (1-spindle) special
Water test for leaks	"Caterpillar" special water testing machine
Press in bearing	No. 2 Atlas compound arbor press
Drill and ream and spotface dowel holes in bearing	No. 1300 Delta Slo Speed bench drill
Wash and clean	"Caterpillar" special washing machine
Drive in 1 dowel, assemble 1 crankshaft bearing, flange assembly and 4 capscrews and line ream bearing	No. B225H Natco vertical boring machine special

Another general view in the machine shops showing battery of new Warner & Swasey turret lathes.

lationship between production planning and engineering design aiming for greater interchangeability already has produced a number of outstanding progressive machine lines of striking modernity.

The past few months have seen the construction and operation of two main tractor assembly lines—both progressive lines on a mechanized floor conveyor—fed by a sub-assembly station at points of usage in the most accepted fashion. This development marks the first step in a program which may ultimately result in a complete rearrangement of the plant, with progressive machine lines located in the assembly building



Outstanding is battery of 32 heavy duty automatic turret lathes supplied by Potter & Johnston. This is a close-up of one of the automatic chucking machines featuring the massive tooling for a flywheel. The turret has five tool faces; all tools are made of Stellite J-metal except hole finishing cutters which are of high-speed-steel.

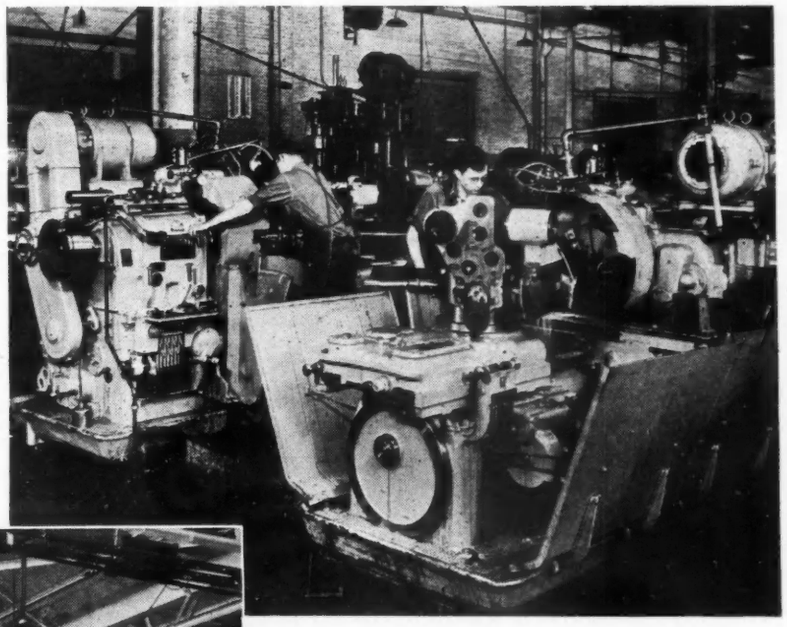
Most striking of the new machine lines, certainly from the human interest viewpoint, is the tight line recently installed for the machining of the two-cylinder starting motor block. Here is an entire line of machine heads built on a single base.

Considering the character of the machine work handled here, it is not surprising to find what is probably the largest battery of heavy-duty Potter & Johnston turret lathes in use in the industry. One department alone has a battery of over 32 of these machines.

Special tool materials are found at every turn. Haynes J-metal tool tips are used almost invariably for the milling cutters on the big mills. Carboloy-tipped tools will be found on precision boring jobs of every description.

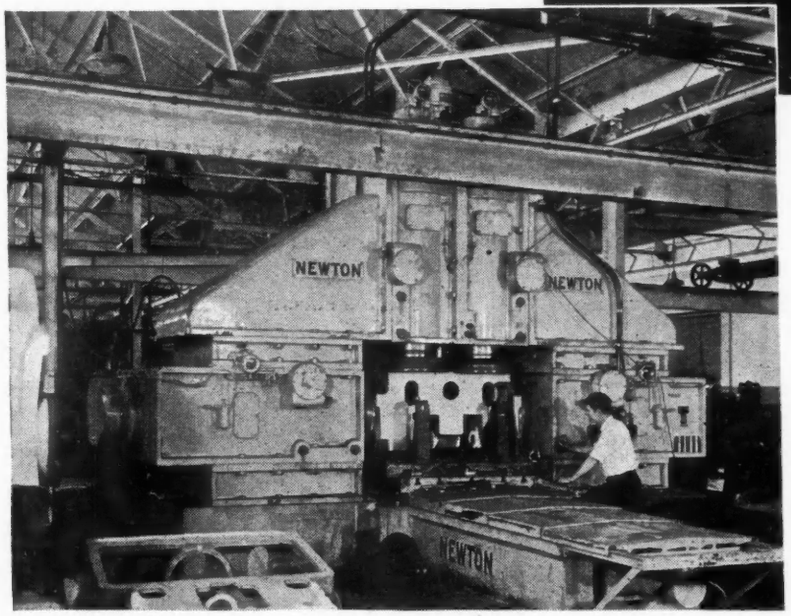
We should be remiss if this brief introduction did not include some comment on the splendid work being done to assure worker comfort and safety. Every device known to the art is generously and skillfully employed. Safety devices for machines and in welding booths; good housekeeping; good light; and generous comfort facilities—the gamut of such devices also includes a recent installation of a costly exhaust sys-

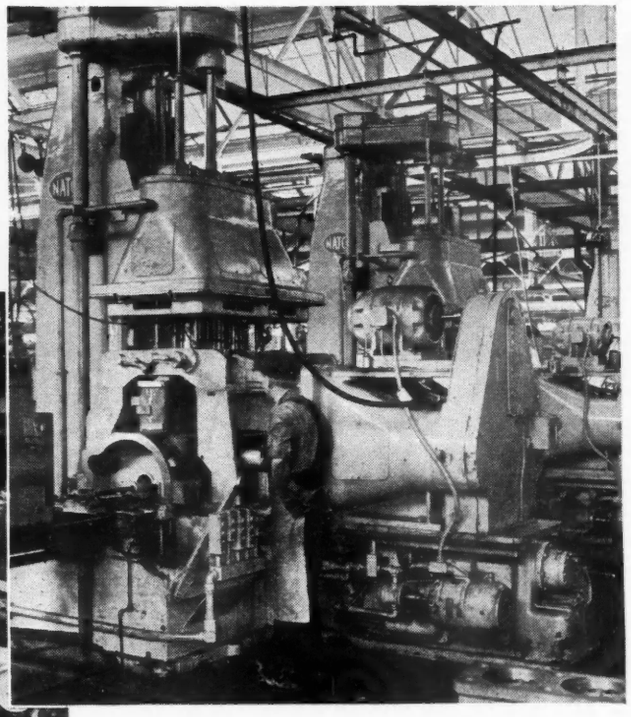
and feeding directly to the assembly conveyor. First promise of this is found in the new transmission machine line for the small Diesel tractor—Model D2—which has been built adjoining the new assembly line conveyor.



(Above) Close-up of two Potter & Johnston heavy-duty turret lathes set up for turning, boring and facing front idler shaft bearings. These machines are part of a large battery of Potter & Johnston equipment in this plant.

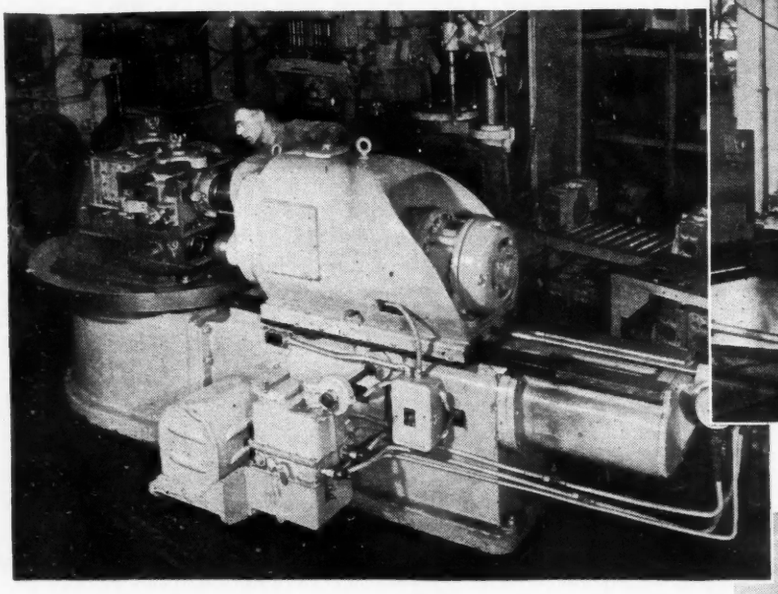
(Below) Giant Newton milling machine, said to be first unit-type machine of its kind, installed here several years ago. Set up on big transmission case, unit-type construction permits of product design changes to any extent.





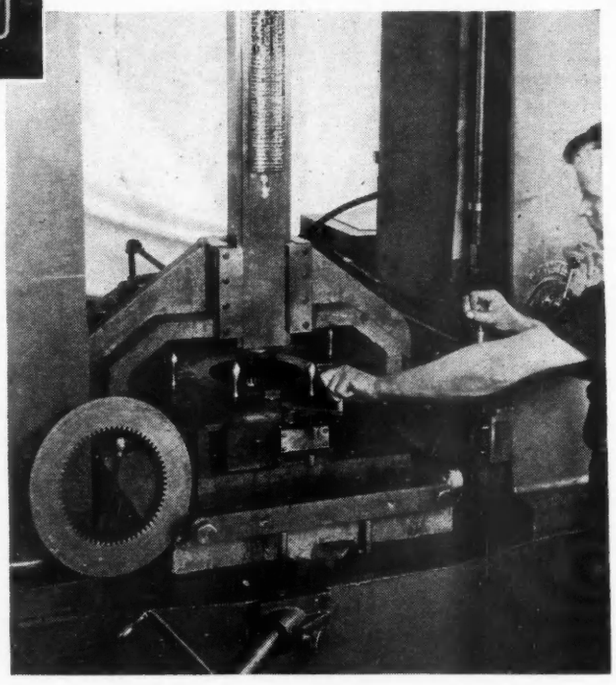
(Right) Close-up of one of the big Natco drilling machines on a diesel block.

(Below) Starting engine block, rough and finish-boring crank and cam bearing bores, on a special W. F. & John Barnes boring machine.

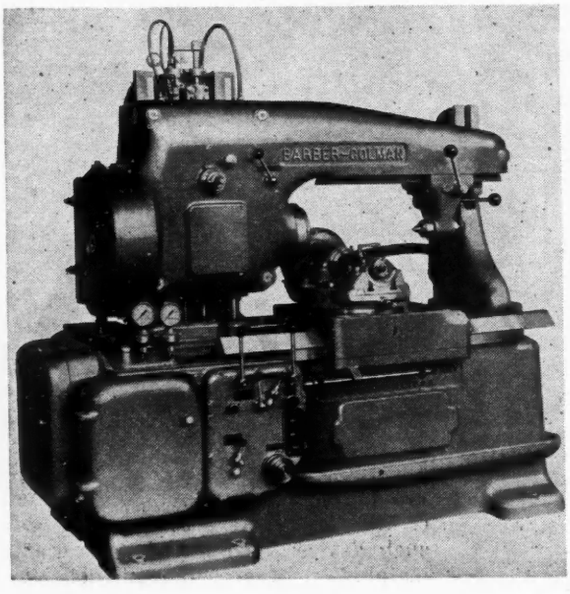


tem for the foundry. There is a modern hospital complete with all the equipment essential to an operation of this scope. And finally, an amazing cafeteria building having capacity for over 4000 people.

Such is the brief high-spotting of this remarkable organization. With-



(Right) Close-up of big Colonial press set up for broaching internal teeth in clutch disks. The broaching tool subtends 60 degrees of arc, finishing the internal teeth in six indexes.



New Barber-Colman Type "D" hobbing machine is part of battery of modern equipment installed in gear manufacturing department.

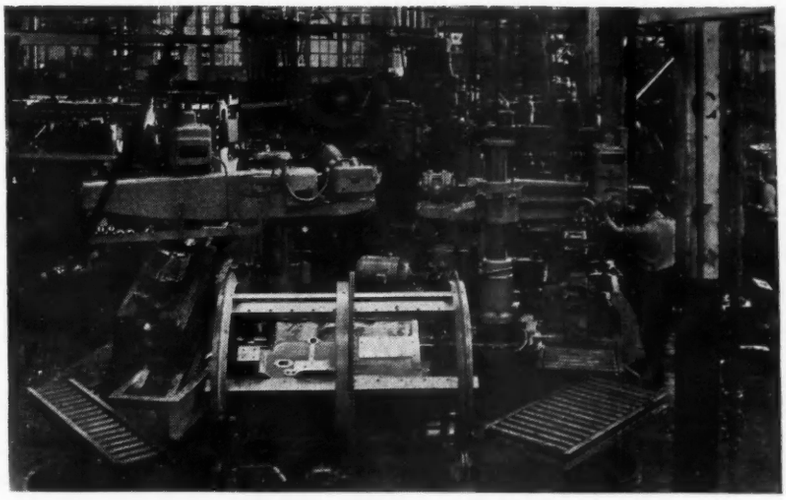
in the limits of this article we shall describe succinctly the chief features of the major departments with time out for certain special machine lines. To complete the perspective, there is a comprehensive pictorial section and a selected group of factory routings covering some of the newly installed machine lines.

Foundry

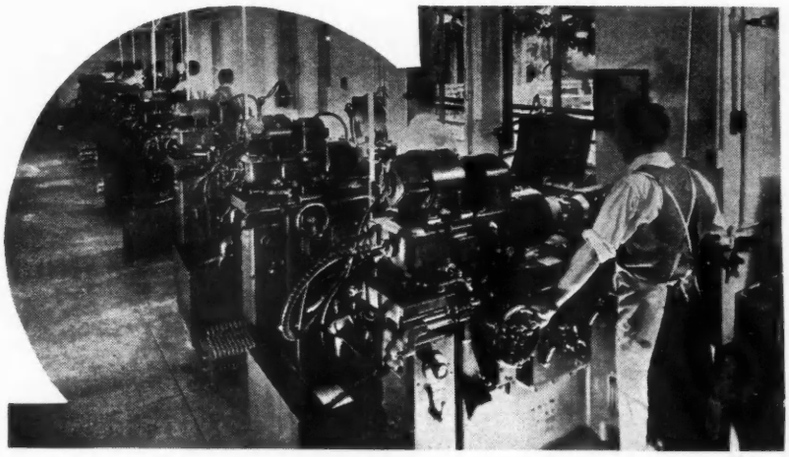
Starting point for all activity is the foundry which supplies all cast-

ings used in "Caterpillar" production. They operate four cupolas with a maximum capacity of 500 tons per day. Castings are delivered to the machine lines by means of the industrial railroad system mentioned earlier.

While much of the foundry metal contains various alloys, in the interest of economy and uniformity, they melt a standard gray iron mixture and then add the alloying ingredients at the spout. Only exception to this practice is cylinder liners which are made of a special composition containing 80 per cent steel plus the alloys. A special heat is run for this metal.



General view of part of one of new machine lines in cylinder block department. In foreground a group of six Cincinnati-Bickford radials and one Carlton radial drill fitted with hydraulic roll-over fixtures, handling all tapping, reaming, spot facing, and spot facing operations.



At San Leandro—section of precision grinding department showing battery of Heald precision grinding machines.

high. The metal patterns are of "clover leaf" form and are molded on automatic machines.

A very large section of the foundry is devoted to shake-out and cleaning, with final chipping and grinding operations on a gravity roll floor conveyor.

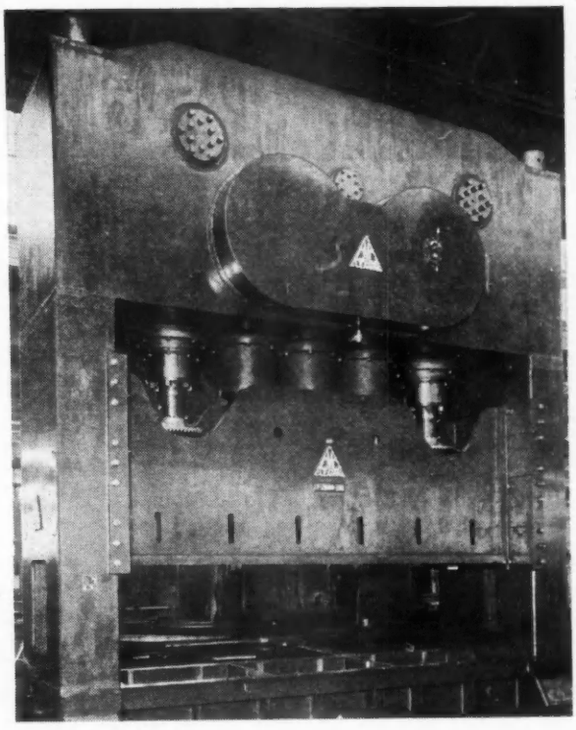
All castings are thoroughly cleaned in Pangborn shot-blasting machines, one of which is a new installation.

In general the foundry is of mod-

Best perspective of the foundry may be gained from the pictorial section. Briefly, it may be said that the foundry is divided into various functions—core rooms, small parts pouring lines, large castings, shake-out, cleaning lines, etc. Dry sand cores are used exclusively and these are baked in "D. S. M." vertical core ovens of which there is a battery of five units for large cores and another battery for miscellaneous small cores.

Most of the large castings such as cylinder blocks, transmission cases, etc., are too bulky and too heavy to handle on mechanized conveyors and, consequently, are poured right on the floor. However, there are five mechanized conveyor lines of the merry-go-round type for pouring small parts.

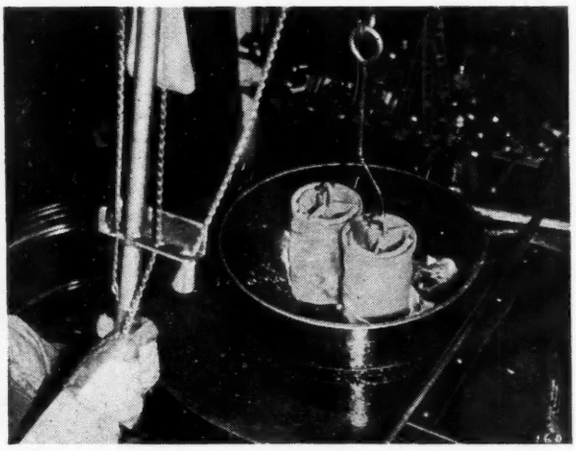
One of the interesting spots is the section set apart for piston rings. Rings are molded in the customary "tree" form with four rings to a mold, the molds being stacked 15



Close-up of all-welded Clearing press rated 1600 tons capacity which is used in forming molding boards in the road machinery plant. The press has a bed area of 60 x 200 inches, a stroke of 12 in., and operates at 10 strokes per min.

Factory Routing—Crankshaft

OPERATION	EQUIPMENT
Cheek, turn and fillet center main and 2 inter	34 in. Wickes Duplex crankshaft lathe
Cheek, turn and fillet front main bearing and form stub end, cheek, turn and fillet rear main bearing and straddle face and form flange	Model CH-4 Wickes Automatic center drive crankshaft lathe
Turn No. 1 and No. 4 pin bearings	34 in. Wickes Duplex crankshaft lathe
Turn No. 2 and No. 3 pin bearings	34 in. Wickes Duplex crankshaft lathe
Drill, counterbore and tap stub end	21 in. Cincinnati-Bickford drill and tapping machine
Recenter stub end	24 in. American engine lathe
Straighten if necessary	50-Ton Logemann vertical press
Form 2 undercuts and chamfer on stub end	17 in. LeBlond engine lathe
Finish turn flange	24 in. American engine lathe
Drill oil holes to pin bearings	Leland - Gifford oil hole drilling machine
Grind No. 1 and No. 4 pin bearings	B No. 81 Norton cylindrical grinder
Drill, countersink and tap flange holes	No. 25—24 in. Foote-Burt heavy duty drill 3 ft. Carlton radial drill
Grind No. 2 and No. 3 pin bearings	B No. 81 Norton cylindrical grinder
Grind front and rear and center main bearing	Type "A" Norton cylindrical grinder
Grind 2 diameters on stub end	14 in. x 36 in. Norton cylindrical grinder
Grind 2 intermediate main bearings	14 in. x 36 in. Norton cylindrical grinder
Rough and finish grind taper on stub end	14 in. x 36 in. Norton cylindrical grinder
Cut 2 Woodruff keyways in gear and taper diameter	No. 2 Kent-Owens hand mill
Mill oil return thread on stub end, and mill small thread on stub end	Lees-Bradner thread mill
Mill oil return thread on flange end	Lees-Bradner thread mill
Finish face flange	18 in. American engine lathe
Polish and lap all main and pin bearings and burr oil holes	18 in. American engine lathe
Chamfer and retap flange holes and retap stub end, remove burrs and oil complete	Bench

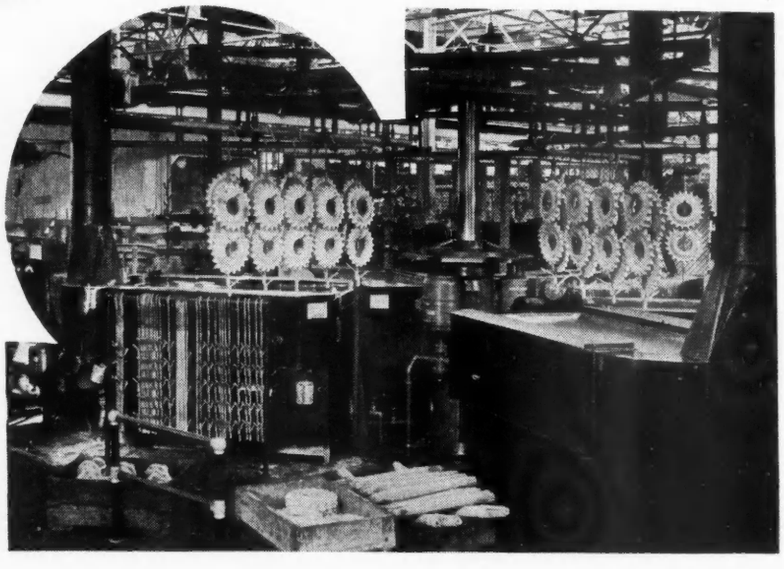


(Left) Oil quenching heat treated piston rings for diesel engines.

(Below) View of the Bullard-Dunn cleaning machine installed in the transmission building. This equipment is used for electro-chemical cleaning of gears, shafts, and various other transmission elements.

parts manufacture. Efficient operation of this department assures prompt service on the thousands of tractors that have been in the field for many years.

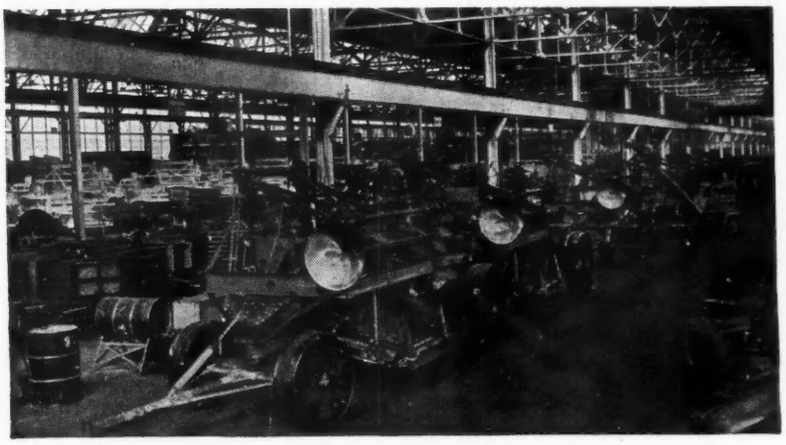
The transmission case department at one time was concerned with the production of cases for all models. However, during the past few months the installation of the centralized machine line for the small tractor in the assembly building has



ern type with mechanical equipment for molding and core production. Cranes, hoists, and molding conveyor lines all contribute to the elimination of mean physical labor usually associated with foundry work. Best example of the pains taken to improve working conditions is found in the recent installation of a complete exhaust system for removing fumes, dirt, and odors.

Miscellaneous Mechanical Departments

Interesting to owners of "Caterpillar" equipment is a large department set up to handle "non-current"



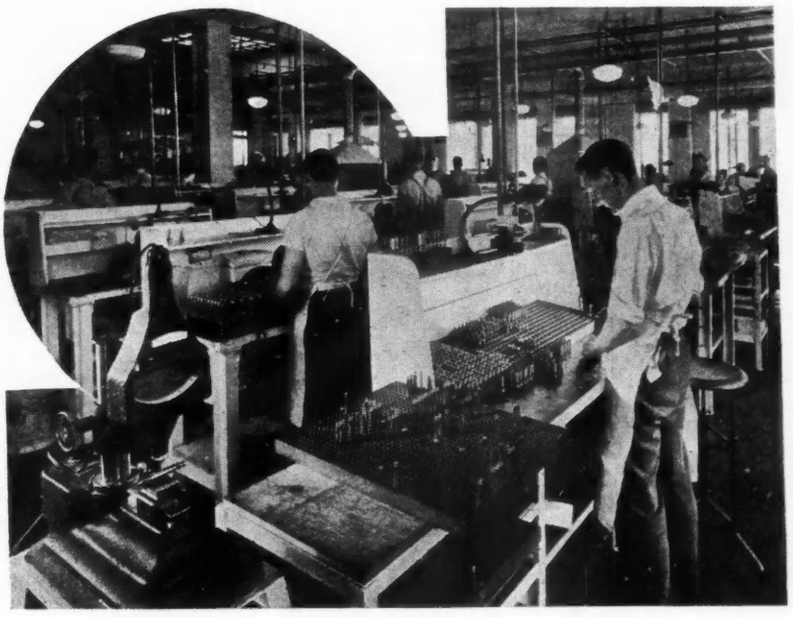
One of the three main assembly lines in the road machinery building. View shows elevating graders under construction.

left the original department free to devote its energies to the large cases only.

Most of the equipment is of the general purpose type, leaning strongly to the use of the large radial drills. A rather unique feature is the use of air operated hoists for each machine, mounted on a large boom to facilitate handling of the heavy castings.

Crankshaft department has a sizable problem in machining the large variety of shafts ranging from the tiny single-throw shaft for starting motors to the tremendous six-throw shafts for the large Diesels. For this reason much of the equipment is of more or less universal character suitable for multiple-lot-production. However, the small Diesel shafts are made on a modern line featuring Wickes turning equipment, as described on the routing reproduced elsewhere.

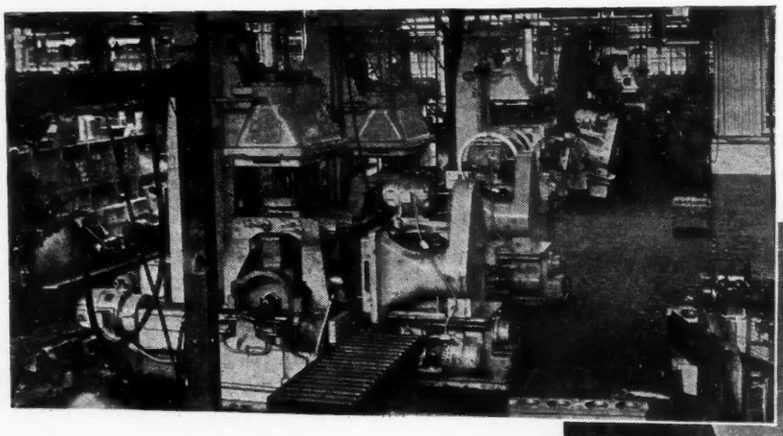
Transmission gears are made in a self-contained department, swarming with a variety of machines required to handle the hundreds of different gears and shafts specified in the wide line of transmissions. Familiar equipment will be seen at every turn—Fellows gear shapers, including the machine for finishing bull rings which is said to be one of the largest in use today; several new Barber-Colman hobbing machines; some of the latest type Lees-Bradner



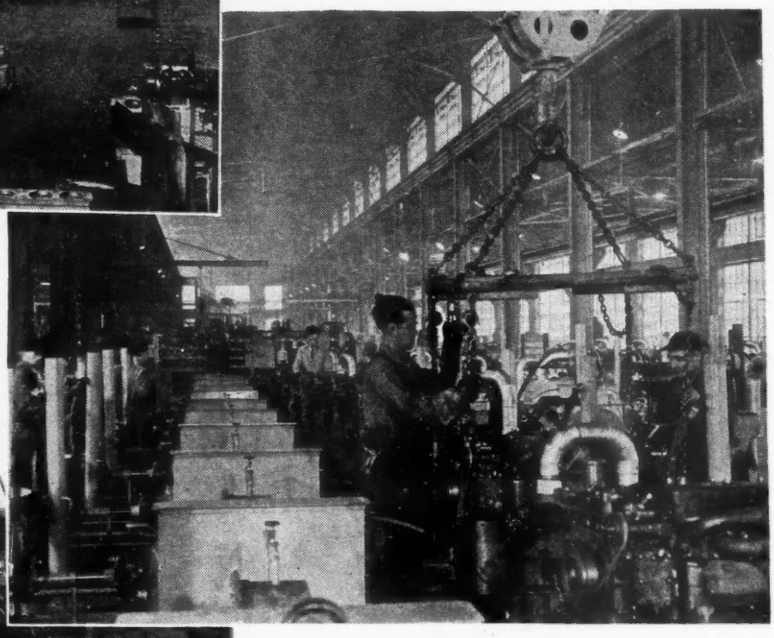
At San Leandro—section of injector lapping and fitting department. At the left is one of the new Sheffield amplifying gages capable of accuracy of ½ millionth of a inch.

Factory Routing—Transmission Lower Constant Mesh and Low Speed Gear

OPERATION	EQUIPMENT	OPERATION	EQUIPMENT
Normalize	48 in. Annealing furnace	Hob teeth gear "B"	Lees-Bradner rotary hobber
Broach hole	No. 3 L-B LaPointe horizontal hydraulic broach	Finish teeth gear "A"	Michigan gear finishing machine
Face hub and gear and chamfer holes at large end	2-spindle Jones and Lamson turret lathe	Round teeth gear "A"	No. 35 Cross gear tooth rounder
Broach splines	No. 3 L-B LaPointe horizontal hydraulic broach	Remove burrs	Bench
Turn all diameters, face both sides of small gear, radius, chamfer and face inside of large gear, face hub at small end and stamp identity and part number	14 in. Single carriage Fay semi-automatic lathe	Harden	24 in. x 18 in. Hump furnace
		Draw	21 in. x 26 in. Homo furnace
		Clean	Bullard - Dunn cleaning machine
Chamfer hole in hub in small end	No. 3 Avey sensitive drill	Test	Rockwell testing machine
Hob teeth gear "A"	Lees-Bradner rotary hobber	Grind hole	No. 11 Teromatic grinder
		Grind ends of hub	No. 16 Blanchard surface grinder

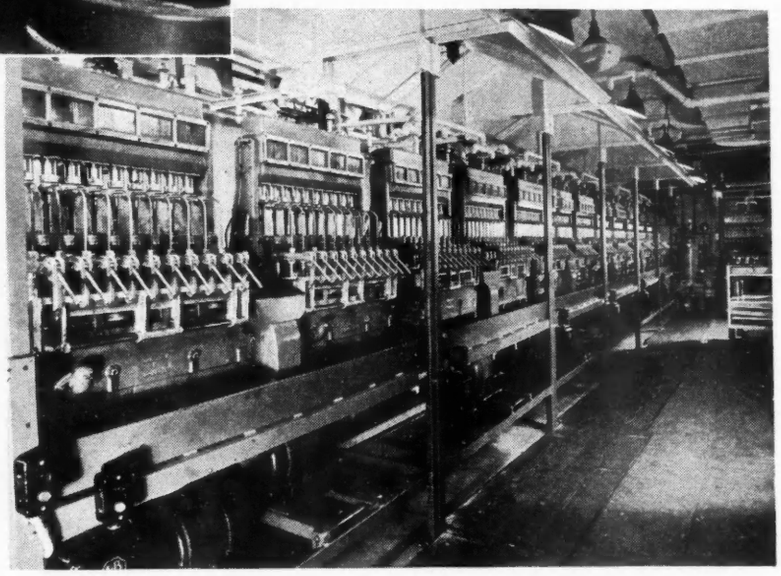


(Left) Another view in cylinder block machine line. Giant Natco drillers may be seen in foreground and extending into the background.



(Right) Double-end engine run in stands, a 100 per cent test procedure.

(Left) One of the three diesel engine final assembly lines on power-driven conveyors. This conveyor is 300 feet in length.



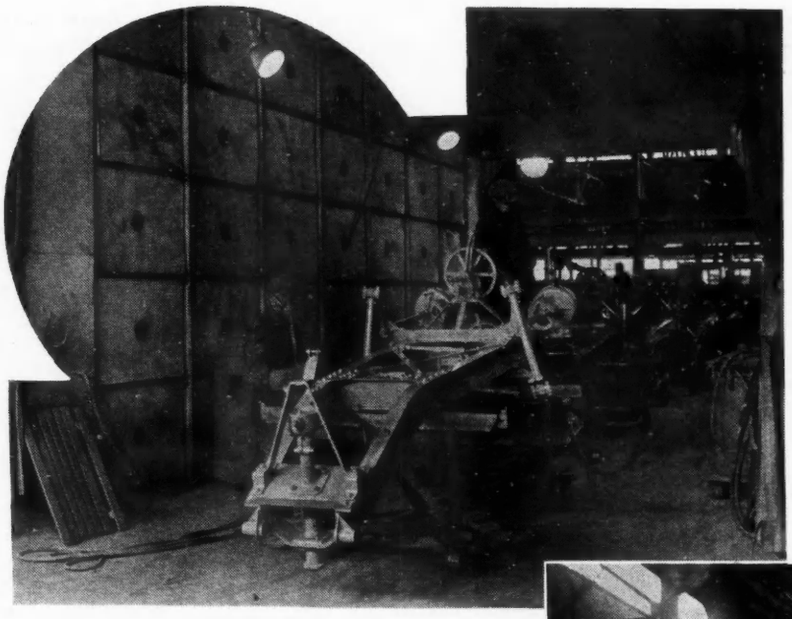
Looking down the battery of injector running-in machines at San Leandro. This is a 100 per cent inspection with all pumps and injectors run at faster than engine speed.

multiple spindle hobbers, etc. Newest member of the family is the Michigan Tool rack shaver for finishing small gears.

A piece of unique equipment is a new vertical LaPointe surface broaching machine set up for broaching the tapered serrations in the big sprocket hub. The ram is fitted with a single narrow tool quite similar to a key-seater, with work indexed around to complete the series of cuts.

Heat treating equipment is decentralized so that each department requiring such equipment can complete its operations within a progressive set-up. This is true of the gear department, making it completely self-contained as to function.

To accommodate the machining of many miscellaneous castings, there is



Interior of huge spray booth in road machinery building for painting the big auto-patrols.

Engine Building

Save for the crankshaft, most of the parts production has been centered in this department. Featuring some of the most modern machine lines to be found anywhere, it represents a high degree of skill both in production planning and engineer-

a battery of over 32 of the latest type Potter & Johnston heavy-duty turret lathes, probably one of the largest batteries of P & J machines in the industry.

Many operations, too, are handled with facility on a battery of the universal type Bullard vertical lathes.

Rarin' to go—from the final assembly lines the tractors run the hurdle of the run-in stands where they tug against the draw bar while pounding on the lubricated metal floor pans.

Factory Routing—Transmission Case

OPERATION	EQUIPMENT
Mill 3 locating pads on bottom	No. 4—36 in. Plain Cincinnati hydraulic horizontal mill
Drill, ream and tap bottom complete	3½ ft. Carlton Radial drill
Rough straddle mill sides and mill top	L55A Newton 3-spindle planer type mill
Finish straddle mill sides	L55A Newton 3-spindle planer type mill
Mill ends and inside face	C77B Newton planetary mill—3-spindle
Bore transmission shaft holes and drill and ream idler shaft holes	"Caterpillar" special boring machine
Bore and face steering clutch shaft holes and spotface upper transmission shaft bore	W. F. & John Barnes hydraulic 3-spindle horizontal boring machine
Drill small holes in front and both sides and drill small holes in top	Greenlee 3-way horizontal multiple drill
Drill and ream and tap top, and drill tap and spotface hole in idler shaft boss, and drill tap and chamfer all holes in rear end	B-14 Natco 18 x 32 in., 24-spindle multiple drill Type OA Carlton light duty radial drill
Drill, ream and tap both sides complete, and spotface and backface holes in top, and chamfer clutch control lever shaft holes	4 ft. Cincinnati-Bickford radial drill
Drill, ream and tap all remaining holes in front end, spotface, and backface idler shaft holes and drill, and tap 3 holes around transmission shaft bore, and backface 3 holes in flange.	3½ ft. Carlton radial drill
Mill behind flange	30 in.—C64A Newton rotary mill
Wash and clean	"Caterpillar" special washing machine
Finish mill bell end and finish bore dowel	Caterpillar special drilling machine and dowel hole borer

ing design for maximum interchangeability.

Tight, self-contained, progressive machine lines have been developed for each of the bores in the current Diesel line—3¾ in. bore, 4¼ in. bore, 5¾ in. bore. By designing engine parts of geometric similarity so as to fit the same fixtures and spindle settings, each line takes the range of sizes for each bore. For example, the 3¾ in. line takes a four and six-cylinder block; the 4¼ in. line takes a four and six; while the 5¾ in. line takes a three, four and six.

To illustrate the general character of machines and tooling, we have reproduced the routing for the 3¾ in. bore line. Consider for example, the Newton milling machine set up to mill the main bearing locks and straddle-mill bearing faces. This is a double-head machine with a fixed set-up for the bearing locks, but with two separate arbors for straddle-milling—one for the four, the other for the six. Another tricky machine is the W. F. & John Barnes machine for cylinder boring. It is fitted with two rows of vertical boring spindles so as to accommodate two blocks at a time, side-by-side. Depending upon the number of cylinders, each row will be fitted with either two or three spindles so that a block may be completed in two passes.

Unusual is a two-way Natco drilling machine, one of a large battery of Natco machines in the plant. The vertical head contains all of the spindles required for both four and six cylinder blocks, but it is fitted with a special attachment so arranged as to automatically cut out the spindles not required at the time. The second, horizontal head, is fitted with an interchangeable cluster plate.

All tapped holes are handled by a battery of Cincinnati-Bickford radial drills. Two of these machines are required to tap holes both in top and bottom surfaces, this operation being facilitated by hydraulically operated roll-over fixtures.

On all blocks, "Caterpillar" has found it desirable to hand-ream the pilot bores for liners after driving the cylinder head studs. This operation removes distortion imposed by the stress of driving the heavy and closely spaced studs.

Before leaving the machine lines, it is of interest to note that great pains have been taken to facilitate materials handling. Machines in each battery are inter-connected by a system of heavy gravity roll conveyors, fitted with turn-table stations and roll-over fixtures at various points. In addition, certain stations located in separate parallel lines are inter-connected by roll-over fixtures which move cross-wise on rails.

Currently "Caterpillar" is switching to the precision connecting rod for which a special precision department has been created. Most interesting of the details is the unusual set-up for finishing the stud holes. In every case, the holes are precision-bored on a Heald 48-A Bore-Matic, after drilling, then broached to produce a fine lapped finish. This is considered essential to perfect alignment of precision bearing shells.

We mentioned earlier that the company now is producing a small two-cylinder starting engine for the small Diesels. This is built on the most compact and certainly the most unique line we have seen anywhere. For the cylinder block, there is a progressive line-up, of which 12 machine heads are all mounted on a ingle base designed by "Caterpillar." It is a development that must be seen to be fully appreciated.

All Diesel engines are fitted with wet liners which are made in a special department, self-contained in every respect. It is extremely flex-

ible as to tooling since every liner in the place goes over the same machines. The liners all are double-honed on a battery of two No. 2610 Barnes fluid motor-driven honing machines, fitted with the new Micromatic hydraulically operated honing tools.

Separate final assembly lines are provided for each of the different lines of engines. Each of the lines is on a power-driven conveyor and served by high-cycle portable tools feeding from an overhead trolley and suspended from Thor balancers.

After assembly each engine is run in for eight hours in the test room. This is done on double-end stands equipped with water brakes. The test equipment is served by a comprehensive system of oil circulation and filtering to protect the new engine.

Sheet Metal Department

Most of the sheet metal parts are produced in a large and well-equipped sheet metal shop. There is a profusion of equipment including presses, shears, torch and arc welding booths, and the like.

The prize exhibit here is a new Colonial power press, rated 20 tons capacity, which is employed for broaching internal teeth for a variety of steering clutch disks. The broaching tool is convex in form and intercepts 60 deg. of arc, or one-sixth of the teeth.

In broaching clutch plates, 13 blanks are placed in the fixture at one time. The ram of the press travels downward, broaching some 8 teeth at one time. Fixtures shuttle out of cut and the ram returns to its upper position. During the return stroke the fixture is indexed by hand to a new position and shuttles back into cut. A total of six strokes of the ram is required to complete the broaching cycle. At the end of the cycle, the fixture automatically travels out 18 in. to unload and reload.

Road Equipment Building

A large structure is devoted exclusively to the production of road machinery. It is self-contained and equipped with a full complement of production machinery, assembly lines, production departments, etc. Welding with the arc and torch is perhaps the biggest operation since the most of the structure is made up by welding. In the few places where rivets are employed, they have adopted the new Hanna squeezer type riveter which eliminates the noise and clatter usually associated with sheet metal assembly.

This department, too, boasts a large machine shop specializing largely in the production of miscellaneous parts and the variety of gearing required for wheel-type machines.

Gasoline or Diesel engines required for the power driven machines come in from the main engine plant. Power drive units consisting of the engine, transmission and axle, then are built up on a special assembly line.

Physically the road building machines are so large that even in this big building, it is necessary to operate three separate assembly lines. In addition to the assembly lines for power-driven machines, there is a separate department for the assembly of terracers and other attachments.

Bright spot is a corner of the building set apart for the forming of grader blades used on the road building machines. Grader blades are large strips ranging from 14 ft. to 18 ft. in length and ¾ in. in thickness, made from high carbon stock ranging 0.85 to 0.95 per cent car-

bon. A new set-up comprising a Clearing press and a Mahr furnace for pre-heating the work has been installed recently.

The Clearing press, rated 1600 tons capacity, is a majestic machine of all-welded steel construction spanning a clear width at the bed sufficient to clear the longest dies. The blanked strips first are heated in the Mahr Mfg. Co., gas-fired furnace, then immediately set in the die, and formed in one operation. It is interesting to note that the heated strip is transported to the press on a movable section of the gravity roll conveyor joining the two machines.

Main Assembly Plant

Coordinating all of the basic production departments is the main assembly building where the entire line of crawler tractors is assembled and tested. Component parts enter the building on the industrial railroad mentioned earlier. Parts and assemblies from other departments are supplemented by a variety of small parts and attachments purchased from outside suppliers and parts makers, and stored in a large bay. The finished stores receiving department is about as large a place as one may see in a day's journey.

Two new final assembly lines—one for the three big tractors, the other for the two small units—are easily the most distinguished centers of activity. Apart from the fact that each of the two lines is the nucleus for the major activity in this plant, there is the fact the lines represent the very last word in coordinated mechanization. In addition to the main assembly lines, there is a bay devoted to the assembly of a varied line of industrial power units.

Consider the high-spots of the new line for the three big tractors. Its main section is a power-driven floor platform conveyor with universally adjustable fixtures. The assembly line extends 368 feet, with sub-assembly stations at the side at points of usage. On this line, all tools are air-operated and suspended from Thor balancers.

Sub-assembly lines, at right angles to the main lines, offer interesting variety both in detail and mechanization, depending upon the size and nature of the parts. The steering clutch assembly, for example, comes to the line on a gravity roll conveyor, from the sub-assembly station. Main shafts come in on an overhead track, on individual hand hoists. Bulky sprocket assemblies feed in on a gravity roll conveyor. Complete engine assemblies are taken directly from the stores bank and transported to the line by an electric hoist.

Following in sequence, we find the transmission covers with controls fed in on a special gravity conveyor consisting of parallel tracks but using large roller wheels at each side instead of long rollers. Radiators come in on individual hoists; sheet metal is brought to the line on gravity rollers.

Various sub-assembly operations on the main assembly line follow roughly the pattern and sequence of the sub-assembly stations mentioned above. As the tractors approach the end of the line, they are a finished product save for the tracks. The track is installed in a rather ingenious manner at a station directly in line with the assembly line conveyor.

Remember, that the tracks, due to their bulk and weight, are quite a problem to handle. To facilitate the operation, the assembly station has permanently fixed to the floor a series of tracks laid down in the variety of standard spacing required for the entire line of machines. The

tractor is lifted off the line by a 16-ton crane and is laid down on the fixed track fixture of proper center spacing. In this position it is lined up precisely with a pair of tracks that had been previously lined up with the fixture. The tractor then is driven onto its track.

Actual installation and locking of the track are accomplished with the aid of a winch running on rails in front of the assembly station. In operation, the far end of the track is attached to a line from the winch, keeping the track taut and in alignment as the tractor walks over it. Then the ends of the track are brought together through the tension assist of the winch, and pinned permanently.

Track assemblies used in the preceding operation are made up according to schedule on three track assembly lines at one side. Each of the assembly lines is served by an overhead high-cycle tool power line.

Every tractor undergoes stringent consumer acceptance tests before it is pronounced fit for service. Principal test is on the run-in stand, illustrated in the pictorial section, where the tractor is tied down to the draw bar and run under power on a lubricated metal track. Because the tractor track and mechanism pick up a good deal of oil and residue during the run in, each tractor takes a shower bath, also illustrated, to remove this material in preparation for the paint job.

The assembly building also has a large screw machine department which feeds all departments of the plant. It has a separate section, complete with the necessary heat treating equipment, for producing track pins and bushings. Prominent in the heat treating department are two of the huge continuous carburizing furnaces made by the Electric Furnace Co.

Finally, it may be noted in retrospect that "Caterpillar" has developed many of its mechanics in its own school for the training of apprentices—and a number of its present executives are products of that school. For those who sell tractors, the company has a sales training division which combines the theoretical with the practical in sessions held in the classroom and on the 150-acre experimental farm close to the factory. The farm is equipped with many kinds of tractors and tractor tools, and its varied topography makes possible a wide variety of practical demonstrations. This training is available to dealers and distributors' salesmen, as well as company representatives. In this way sales problems are solved and sales points are proved before the eyes of each representative.

Fluid Circulating Pump

Binks Mfg. Co., Chicago, recently brought out a self-contained fluid circulating pump, operated by electric motor or by air motor drive. It is designed to deliver clear lacquer and varnish, and other non-pigmented finishing materials from the original shipping container to the spray gun.

Known as the P-54 unit, it can be readily changed from one drum to another in a few seconds. The circulating pump is claimed to give results similar to those obtained with a pressure feed tank. The pump also eliminates the necessity of transferring the material from the original shipping container and makes possible an economical pressure feed system direct from the drum. Motor pump, relief valve, and fluid feed regulator are mounted on a steel base plate which may be secured to the top of the drum or attached to brackets fastened to the wall above the drum.

Just Among Ourselves

Welcome Drop In Steel Prices

REDUCTIONS in the price of automotive steels, which seem likely to be general in application, and which apply on deliveries up to Sept. 1, are welcome news. Some of the conditions which accompany them becloud the total effect a little, but the reductions as such seem substantial enough to ease considerably the early purchasing for 1939 models.

Our Washington office reports that the price reductions have been a source of gratification to New Deal officials, from the President on down. There is a corollary to this view: it is not believed in Washington that automobile prices can be reduced unless other producers of materials grant similar price concessions.

Various Washington officials have been outspoken in their view that automobiles for this year were priced higher than necessary. Reductions in the prices of other automobile components may result in a premature revival of this view, because of the excuse supplied.

But the steel producers themselves seem to regard the price reductions as an experimental move which can be continued only if there is increased volume to justify them. If the volume does not materialize, and there is pressure (governmental or otherwise) to maintain the reduced price level there will be more talk of reducing wages in the steel industry. And reduced wage levels in the steel industry would not help to improve the purchasing power on which the automobile industry is dependent.

It must be remembered that reductions in the price of steel affect a product which is purchased by literally hundreds of automotive companies which manufacture various components for the automobile. One can assume roughly a ton of steel going into every car and assume that the immediate saving on steel may range around $3. But this saving is distributed at once among parts and accessory manufacturers, many of whom are now operating in the red and in no position to pass along the savings to the motor vehicle manufacturer.

Some of the new steel prices have been posted on a uniform F.O.B. basis without reference to basing points. Opinion on the implications of this are divided, and it is probably too early to predict what it means.

Looks Better

THIS issue of AUTOMOTIVE INDUSTRIES is the fattest regular weekly issue in something like seven and

a half years. It makes us feel much more inclined to believe the Washington predictions that August and September will show a cautious but decided upturn in general business.

HERBERT HOSKING

Contract Board Recommends Minimum Wage Schedule for Aircraft Plants

The Labor Department's public contract board, the administrative agency for the Walsh-Healey Act, has recommended that a 60-cents-an-hour minimum wage, or $24 per week of 40 hours, be the approved national standards to which aircraft manufacturers would adhere in order to qualify for Government business. Learners or apprentices, under the recommendations, could not exceed 15 per cent of the total number of workers in any one establishment and would receive not less than 40 cents an hour or $16 per week of 40 hours.

The announcement, dated June 24, gave interested parties an opportunity to file objections within a 14-day period, after which the board's recommendations will be given the Secretary of Labor for final decision. The board's findings are the result of public hearings conducted on March 10, 1938, in Washington, and based on wage data submitted by the Aeronautical Chamber of Commerce, the United Automobile Workers and the International Association of Machinists and others.

While finding that wages paid workers in plants manufacturing engines were somewhat higher than in other branches of the industry and that wages paid employes by propeller manufacturers were also higher within a limited range, the board found that the prevailing minimum wages in the various branches of the aircraft industry were sufficiently uniform to fix a single rate applicable to the entire industry. The board also found that there exists no clear pattern on which to base any geographical differentials and that such differentials "do not exist between any ascertainable sectional divisions."

The search for the prevailing minimum wage, the basis for determining the labor standards under the Act, was complicated further, the board said, because of the "substantial number of learners" employed in manufacturing processes. It reminded the industry that testimony presented during public hearings showed that learners were employed in the execution of Government contracts despite the fact that testimony indicated that during recent years learners could have been dispensed with. It determined, however, that about 15 per cent of the industry's employes are learners and that the 15 per cent tolerance recommended is subject to future changes depending upon changing conditions in the industry.

The recommendations, if adopted, will affect manufacturers contracting with the Government for the manufacture or supply of "aeroplanes, aircraft engines, propellers, accessories, and for the manufacture and finishing of parts."

William J. Browne

William J. Browne, 68, who retired in 1929 as assistant general superintendent of Buick Motor division of General Motors Sales Corp., died June 25 after an illness of three years.

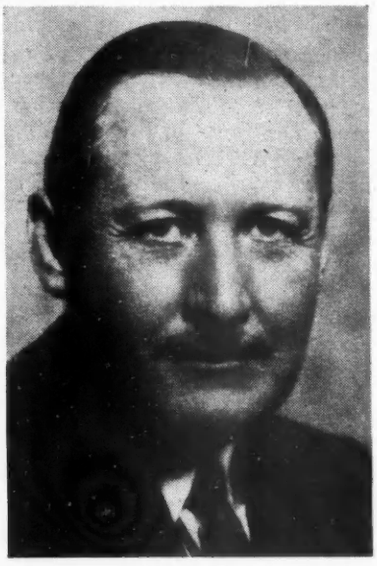
What They Said at Commencements

Automotive Executives Were Principal Speakers at Numerous College Graduation Exercises

Before this year's college graduates packed away academic gowns to try their luck in business and industry, thousands heard commencement messages from a number of prominent automotive executives. C. F. Kettering, general director, research laboratories, General Motors Corp., spoke at the Georgia School of Technology; Harlow H. Curtice, president of the Buick division, of G.M., at Olivet College; Carl Breer, executive engineer and member of the board of directors of Chrysler Corp., at Clarkson Memorial College of Technology; Dr. James Shelby Thomas, president of Chrysler Institute of Engineering, at the Case School of Applied Science; and W. J. Cameron, Ford Motor Co., at Cumberland University, Alma College, Detroit Institute of Technology; and Grove City College.

C. F. KETTERING: "The biggest problem that industry has today is that of not knowing how to develop new industries. We are so developed from the standpoint of manufacturing that we do about the best job possible under existing circumstances. But that favorable accomplishment makes also for deterrents. We must hope to do that which is necessary; help to lay the foundation on which new industries can be built."

HARLOW H. CURTICE: "Whether you teach or farm or clerk or mind a machine or run a surveying chain or sell goods or drive a ship or run a factory or go into politics, do it the hard way. Give more of yourself than your job has a right to expect. The more you give the more you will have in yourself to give. The more you have to give the greater the call for your services. The more you think the more you stretch your skull. The more you stretch your skull the bigger the thoughts you have room for. Whatever you do, give *all* of yourself to it—immerse yourself in it, surrender yourself to it, fuse yourself into it, lose yourself in it. Every moment in that process you are adding to the only capital that no one can take away."



HARLOW H. CURTICE

. . . president of the Buick division of General Motors Corp., who was one of several automotive executives to address 1938 college graduating classes. Mr. Curtice delivered the commencement address at Olivet College.

CARL BREER: "I am, in no sense, a 'rugged individualist,' but

I still believe, that, to institutionalize a man is to kill him. We are in the fix we are in today because too many of us worried about the *world* and forgot *ourselves*. We became so excited about our 'social responsibility,' we clear forgot our 'individual responsibility.' We have clamored to high heaven about our rights, while ignorant of its techniques and shunning its responsibilities. We are told to lose our 'individual consciousness' in 'the social consciousness.' There is a good deal of *can't* here. It substitutes only generalizations for individual responsibility and has only the merit of being the easiest way out, for—a mediocre life."

DR. JAMES SHELBY THOMAS: "We live in a time of terrific indictment and feeble solutions. Our solutions are feeble because we are indicting the wrong things. I am not so disturbed about the machine, the profit system, capitalism and systems of government, as I am poor citizenship and the breakdown of moral and ethical character. This is much more serious than any temporary dislocation of economic dislocation. . . . What we need today, is not so much criticism of the machine, but an intelligent effort on the part of the intelligensia and the idealists to teach our people how to wisely use the leisure time the machine has provided for them."

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

The Paris Exhibition

The motor vehicle exhibition at the Tuileries . . . . comprised over 700 motor vehicles and more than 350 exhibitors. Many of the French manufacturers have discarded the chain for transmission, and have adopted the direct gear, or belts fortified by links or provided with special takeups. Aluminum has evidently found a place in motor vehicle designing in certain parts of the motors as well as in the bodies. . . . . Electric ignition is evidently supplanting the hot tube . . . . Much of the complication in transmission has been done away with by varying the speed of the motor, reducing the number of gears required and making the vehicle more responsive to the operator.

From *The Horseless Age*, July, 1898.

Rolls-Royce Shows 1937 Profit Of $1,948,598.35

Rolls-Royce, Ltd., reporting for the year ended Dec. 31, 1937, showed a profit of $1,948,598.35 after expenses, depreciation, provision for obsolescence, directors' fees, etc., but before transfer to taxation reserve of $495,500, transfer to pension fund of $148,650, and other reserve of $110,328.03.

Willys Omits Dividend Due July 1

Directors of Willys-Overland Motors, Inc., at a meeting June 28, took no action on the preferred dividend due July 1. Officials said that the omission was "in furtherance of the company's conservative policy."

Willys financial statement at the end of the first quarter this year showed cash amounting to $1,492,241.

SAE Postpones Production Meeting

The Society of Automotive Engineers has shifted the date for its National Production Meeting, originally scheduled Nov. 30 to Dec. 2, to the Annual Meeting in Detroit, Jan. 9 to 13, 1939.

Automotive Metal Markets

Largest of "Independents" Matches Price Cutting Action of Leading Steel Producer; Others to Fall in Line

Announcement late last week by the leading steel producer of price reductions, which lowers the cost of sheets and strip steel by $4.50 and that of steel bars by $3.50 a net ton, was followed early this week by the posting of corresponding price reductions by the largest of the "independents." Other steel producers let it be known that they were meeting the price cuts, which became immediately effective.

Because the first of the price reduction announcements listed f.o.b. Pittsburgh and Chicago prices in parallel columns, thus adhering to the traditional base-point differential system, while that of another company, none of whose mills are further west than Buffalo and Pittsburgh, named uniform f.o.b. prices for all of its plants, some saw in this development a complete change in the steel market's pricing system. This view, however, was not shared by all. New prices are to apply to all shipments made up to Sept. 30.

Steel producers insist that, although they deemed it expedient to lower their selling prices before the unions had agreed to a reduction in wage scales, so as to hasten recovery, this does not alter the necessity of such an adjustment before long. Some of the steel manufacturers say they are willing to give the net setup a try-out, but that, if volume of demand doesn't show an appreciable rise from now on, they just won't be able to defer bringing wage scales and payrolls into line with the lower prices just announced.

While some tonnage sales to automobile manufacturers are reported to be in process of negotiation, only a moderate addition to finishing mills' order books has so far been recorded. Employed ingot capacity this week is 28.7 per cent, compared with 28 per cent last week. There has been a loosening up on orders from non-integrated rolling mills, which, now that the price of sheet bars has been lowered to the extent of $2.50 a ton, have begun to replenish their run-down reserves.

Leading Pittsburgh and Youngstown pig iron producers reduced prices $3 a ton on Monday and Middle West furnace interests were reported to be following suit, bringing the price of foundry and malleable to $21 a ton. This is expected to revive speedily buying by automotive foundries, nearly all of which have permitted their pig iron reserves to drop to virtually nothing.

While the pace in the tin market was slightly slower early this week, there is no mistaking the steady pushing forward in London and Singapore to bring about the higher prices, which are the avowed objective of the International Tin Committee. November and December maturities are now selling at a good premium over nearby deliveries. Spot Straits tin was quoted at 42.60 cents at the opening of the market this week. On Tuesday the market eased off to 42¼ cents, but the feeling was general that this is more of a case of marking time than any change in the direction of the market, which was unmistakably upwards.

The export price of copper stood

¼ to ½ a cent above the domestic quotation on the first two days of the week. There was considerable speculation as to whether an advance in the metal's price here was in the offing. Some of the market comment was to the effect that recent Washington criticism of the uniformity of producers' quotations acted as a restraining influence. Some outside holders were asking a premium on Monday, offers at the "official" price of 9 cents having dried up.

Following a heavy buying movement, the lead market turned more quiet, but marketers feel much more confident regarding the outlook. Zinc also marked time following a mild upturn in consumer buying.—W.C.H.

New Car Financing For May Tops April By 1 Per Cent

Dollar volume of retail financing of new passenger automobiles showed an increase of 1 per cent for May as compared with April, 1938. As compared with May, 1937, however, there was a decrease of about 57 per cent, according to preliminary estimates by the Department of Commerce.

All percentages presented below are based on daily average figures with each business day of the week weighted according to the relative volume of business as determined by experience in the trade. Comparison of May, 1938, with the same month of previous years and the percentage changes from April to May in past years are shown below:

Comparisons of May, 1938 With the Same Month of Previous Years

May, 1938, was

56.9	per cent	lower	than	May,	1937
60.1	"	"	"	"	1936
29.5	"	"	"	"	1935
28.7	"	"	"	"	1934
29.4	"	higher	"	"	1933
42.7	"	"	"	"	1932
30.1	"	lower	"	"	1931
46.7	"	"	"	"	1930
60.4	"	"	"	"	1929

April-May Changes

Percentage Change from April	
May, 1938	+ 1.3
" 1937	+ 6.2
" 1936	+ 3.4
" 1935	— 5.5
" 1934	+10.7
" 1933	+27.9
" 1932	+10.1
" 1931	+ 0.2
" 1930	— 1.2
" 1929	+ 9.2

Tools of Tomorrow

(Continued from page 9)

ment for set-up is conveniently located on each cutter spindle, allowing adjustment as fine as 1/600 of a turn.

The work gear indexing idler swings upward and to the left to accommodate different size gears. This idler is driven through the second train of constant mesh gears mentioned above and is synchronized with the cutter spindles so that the machine cannot get out of "time," eliminating scrap otherwise encountered with the use of index plates, ratchets, pawls, etc. Another feature of the machine is the automatic cycle control which stops the spindles in such position that the work may be unloaded and loaded without interference from the cutters or manually positioning of same. Other features include Timken tapered roller bearings throughout, pressure lubrication of all bearings and points where wear may occur, and built-in coolant system. Clamping of the work is optional and may be accomplished by means of a manual hydraulic or air operated fixture.

Changeovers are quickly and easily effected, since only a change in pitch can make necessary a change in the idler gear. Gears of identical pitch with different numbers of teeth only require adjustments and simple adapters.

Production Lines

Lube Tax

Best and most reasonable suggestion for alleviating what is considered to be an unjustly administered tax on the cutting fluids used in metal cutting came from a session of the Independent Research Committee on Cutting Fluids at White Sulphur Springs. Admitting the difficulty of showing what types of operations might be exempted from the tax and assuming that all cutting fluids will continue to carry a tax burden, here is the suggestion: At present the materials used in cutting metals carry the same tax as all lubricants, namely 4c. per gal. But this rate is based upon a high grade refined mineral oil for engine lubrication, selling to the public at an average price of $1 per gal. Consider that the average cost of cutting oils runs only about 20c. per gal. The consequent tax is at the extraordinary rate of 20 per cent. The suggestion made is this: Let's continue the tax but let it be on a percentage basis. Make the tax on the lower priced materials at the rate of 4 per cent! This seems to be a fair way in which the situation might be handled in the interest of everyone concerned.

Chevrolet Engineers

Most instructive presentation we have noted in a long time was rationalization of Chevrolet experimental procedure of testing and organization by J. M. Crawford, chief engineer, and P. A. Collins, experimental engineer. We knew that Jim Crawford bossed a big organization but we never knew just how big. Actually the Chevrolet engineering organization includes over 550 technical people.

Comfort Instrument

While riding comfort research has gone on apace in recent years, it remained for Roy Brown of Firestone, father of the air spring, to present a study which gives the details of currently available instruments and instrumentation. By all means arm yourself with a copy of this study, "Instruments for Measuring Riding Comfort," which was distributed at the Summer Meeting. He describes the best instruments now in use and showed these instruments at the meeting.

Vapor Lock

Certain proceedings at White Sulphur Springs intimate that the problem of vapor lock either on motor cars or heavy-duty equipment is by no means a thing of the past. We don't hear so much about it,

apparently, only because of improvements in the automatic choke, generous venting of carburetors and other points in the fuel system, etc. On heavy-duty equipment, vapor locking tendency is greatly subdued by the use of pusher-type fuel pumps which may be mounted at the gas tank, e. g., King-Seeley and Auto-Pulse.

Flexible Drive

Hector Rabezzana, famed AC spark plug expert, threw in a suggestion that ignition distributors might be driven by flexible shaft so as to free this important element from its usual positional limitations. With a good reliable flexible shaft drive, the distributor could be located in the most favorable position, shielded from the effects of heat, dirt; also with respect to the shortest possible path for high tension leads.

Voids Wiggles

Buried at the tail end of the excellent Summer Meeting paper—"Harshness in the Automobile"—by Hicks and Parker of Chrysler, is a note on a new form of shock or vibration cushioner for use at the spring ends. These insulators, still in the experimental stage, consist of rubber bonded to small metal discs and so mounted as to load the rubber in shear. They are free to deflect in all directions vertically and longitudinally but are restrained laterally. For front independent suspensions, these insulators may be applied in the knuckle support.

Car Diesel

Interesting item noted by many of those who spent some time at White Sulphur Springs was a European car fitted with a small four-cylinder Diesel engine. The engine is built under Oberhaensli license and is the same as made by Peugeot for its light trucks. It is rated 55 hp. at 3300 r.p.m. Physically it makes a mighty clean and attractive powerplant.

Full Control

Big things are expected of car heaters for the '39 season. Not only bigger and better but redesigned to distribute heated air around ends of the front seat and thus into rear compartment. This arrangement permits of better control of car temperatures. As we understand it, some enterprising organizations will make heat-sensitive switches which will control heater fan operation in accordance with air temperature.

Bearing Fatigue

For those who follow such matters, the presentation by Arthur F. Underwood of General Motors Research on "Automotive Bearing Metals and Their Application" held two points of especial interest. First and foremost was the presentation of lantern slides in natural colors, permitting the observer to visualize the condition of the bearing just as if he had performed the test and viewed the bearings with his own eyes. The other point—and most significant—is the observation that many bearing metal alloys serve as excellent oil filters. With such metals, if dirty or contaminated oil is permitted to circulate, the bearings will load up rapidly and do things to both the bearing and the journal. Certain alloys are entirely unaffected by the dirty oil.—J. G.

Supercharger Drives

A. L. BERGER and Opie Chenoweth of Wright Field discussed supercharger installation problems, at the SAE Summer Meeting, explaining that they could not deal with supercharger-design problems because of military policy.

Two such problems that have received much attention are the method of driving centrifugal superchargers and the location of the carburetor relative to the compressor. There are four common methods of drive, as follows:

1. Single-stage compressor gear-driven from engine at a fixed ratio.

2. The same, driven through a multi-speed gear with clutches.

3. Two-stage or multi-stage compressor driven direct through gears.

4. Compressor driven by exhaust-gas turbine.

With methods 1 and 2 the carburetor is usually located on the inlet side of the compressor, whereas with methods 3 and 4 it is usually between the engine and the major part of the supercharger. This latter arrangement facilitates cooling the compressed air by a heat interchanger before it is introduced into the engine, which is the principal reason the last-mentioned methods of drive are favored for high-altitude applicationn. Cooling a *combustible mixture* after it has passed through a compressor is rendered more or less impractical by the fact that the heat exchanger would have to be able to withstand the pressures of backfires.

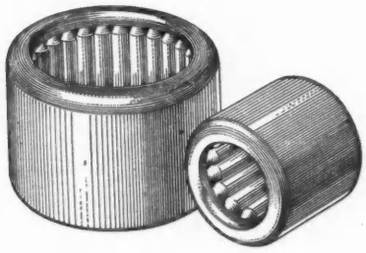
Fig. 1 shows a turbo-blower installation in diagram. The engine exhaust is led through manifold C to nozzle box J, which directs the gases into turbine buckets on wheel I. The speed of the wheel is controlled by the blast gate E, which in turn is controlled by the automatic regulator G. Air for the engine is taken into the compressor at L, and after compression is delivered to intercooler before it enters carburetor D. from which latter it passes on to the engine. To prevent vapor lock (which is most likely to occur under full load at high altitudes), the fuel pump is submerged and has remote drive from the engine.

Regulation of the supercharger is by means of an automatic device of the balanced-diaphragm type, with hydraulic servo mechanism which can be made to operate at a constant pressure regardless of altitude, or can be so arranged that the pilot can adjust the pressure to meet operating conditions. In both cases the controlled pressure is that immediately ahead of the carburetor and just beyond the intercooler. In the case of constant-pressure control the pilot control is limited to the engine throttle, the automatic control tending to maintain sea-level pressure immediately ahead of the carburetor regardless of throttle position. This ensures automatic mixture control, except for the effect of variations in the air temperature on mixture ratio. With the other system, individual controls are required for the throttle and the regulator.

Considerable amounts of power are required to drive the superchargers. At 30,000 ft. altitude, to maintain sea-level pressure at the carburetor inlet under certain conditions specified in the paper, requires 196 hp. in the case of a 1200-hp, and 326 hp. in that of a 2000-hp. engine, provided the normal atmospheric temperature for that altitude is maintained at the carburetor inlet. If the air enters

TORRINGTON NEEDLE BEARING

DESIGN AND SERVICE FEATURES



SMALL BEARINGS TAKE HEAVY RADIAL LOADS

Reduce Space Requirements

THE MANY linear inches of bearing surface provided by the design of the Torrington Needle Bearing permit the handling of severe loads with unusually small sizes of bearings, in both rotating and oscillating applications. The full complement of small-diameter needles gives ample capacity for the heavy service encountered in the king pin illustrated.

Moreover, the design of the bearing—its long axis and small diameter—makes it possible to use a very simple type of housing construction, easily adapted to assembly-line production methods. The unit construction of the bearing permits quick assembly in the housing—another important factor in maintaining the speed of the assembly line.

Ease of Lubrication

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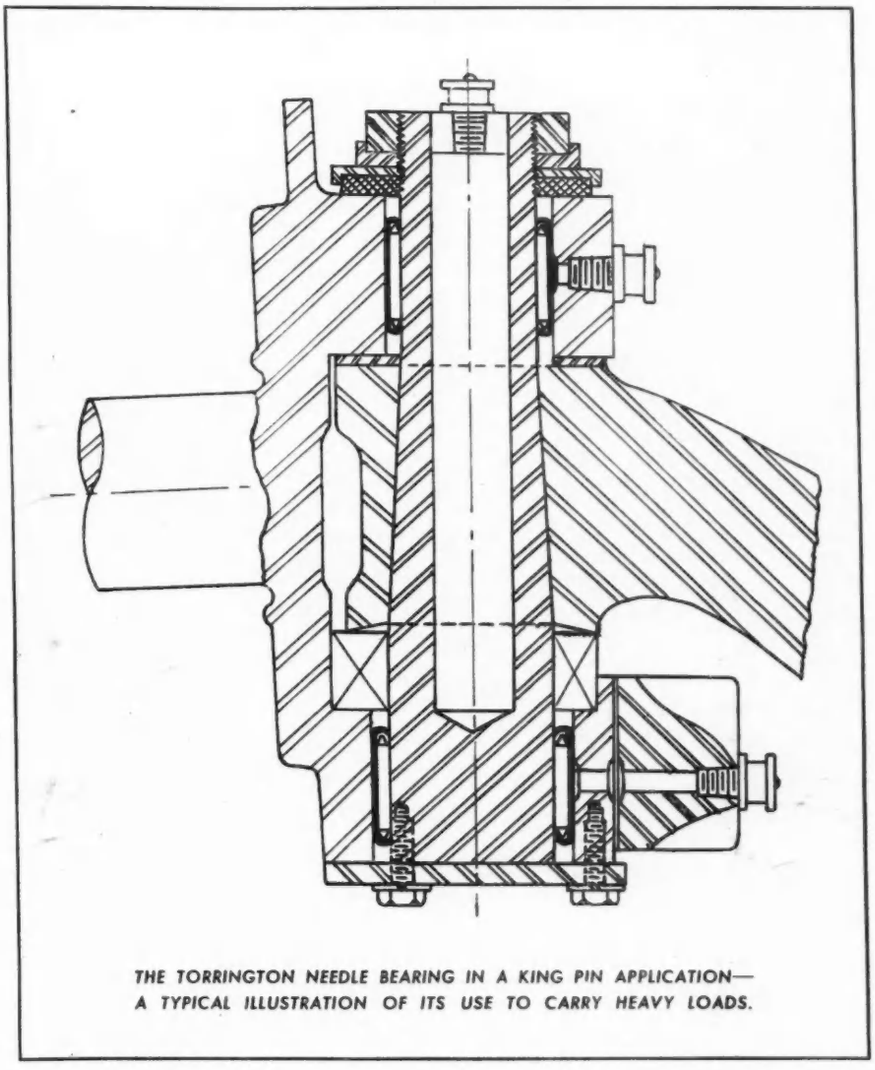
The Torrington Engineering Department, with its long experience in the laying out of bearing applications, will cooperate with manufacturers interested in using the Needle Bearing in their products. Further information is given in the Torrington Needle Bearing Catalog, available on request. Write for Catalog No. 7.



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I—Turbine
J—Nozzle box
K—Air collector ring
L—Air compressor
M—Fuel pressure regulator
N—Fuel pump
O—Flexible drive
P—Fuel pressure gage
Q—Oil pressure gage
R—Pressure control
S—Oil pressure conn. on engine
T—Intake manifold press. gage
U—Fuel tank

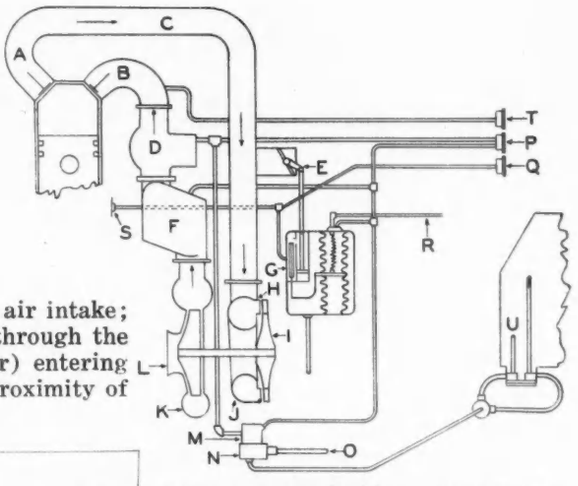

Diagram of turbo-blower installation

the carburetor 50 deg. Fahr. above that temperature, then the powers required for driving the superchargers are 220 and 366 hp., respectively. Such heating may result from (1) the air inlet duct being heated by waste heat from the engine; (2) exhaust gas entering the air intake; (3) air that has passed through the intercooler (as cooling air) entering the air intake, and (4) proximity of the air intake to the exhaust collector.

A supercharged intercooler not only must be an efficient heat exchanger, but it must also show a low pressure drop. High pressure drop through it has the following disadvantageous results:

(1) The exhaust back pressure is needlessly high for a given carburetor inlet pressure.

(2) The supercharger rotates at an unduly high speed to overcome the pressure drop through the intercooler.

(3) The supercharger pressure ratio, and consequently the final temperature of the air delivered, is unnecessarily high, which throws an additional burden on the intercooler.

(4) The combination of a high back pressure and a high temperature is conducive to detonation.

In designing an exhaust system for an exhaust-driven supercharger, it is necessary to provide sufficient area throughout the system to avoid excessive pressure loss; to use adequate flexible connections to prevent undue thermal and vibration stresses and obviate leakage, and to provide enough cooling to prevent failure of parts of the supercharger which come in contact with the exhaust gases.

Laboratory tests indicate that it is possible to obtain the necessary take-off power by the use of an exhaust-driven supercharger applied to an engine having a low blower gear ratio. However, flight tests are required to make certain that an airplane installation can be made which will permit the engine-supercharger combination to function as it did under laboratory conditions.